



United States Department of Agriculture
Forest Service

DRAFT Sweet-Ione Vegetation Management Project: Wildlife Specialist Report

Newport-Sullivan Lake Ranger Districts

Colville National Forest

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1.0 Introduction

The USDA Forest Service, Colville National Forest (CNF) proposes to manage timber and other forest resources on National Forest System (NFS) lands in the Sweet-Ione Project Area. Proposed activities would include temporary road construction, timber harvest, post-harvest road closures, post-harvest fuels reduction, and habitat improvements. This document is an analysis of the effects of the Sweet-Ione project to sensitive species listed for the CNF by the regional forester of the Forest Service's Pacific Northwest Region (R6). Also addressed here are project effects to surrogate and management interest species (USDA 2019), and "landbird focal species for conservation" in the Northern Rocky Mountains of Oregon and Washington (Altman and Bresson 2017).

Two major issues related to project effects to wildlife are covered in detail in this report: suitable habitat for species that are dependent on closed canopy stands with large trees, and suitable habitat for species dependent on open, park-like stands with large trees. A major wildlife topic addressed is management of deer and elk ranges.

1.1 Project Area Description

The Sweet-Ione Project Area covers approximately 20,434 acres (31.9 square miles) within the Selkirk Mountain Range of northeastern Washington State. Private lands along the Pend Oreille River border the project area to the east. The town of Ione is located on the southeast edge of the area. On the western edge is a major watershed divide that separates the Newport-Sullivan Lake Ranger Districts from the Three Rivers Ranger District. The northern edge of the project area abuts the Abercrombie-Hooknose Roadless Area. This rugged, remote area was recommended for wilderness status in the Colville National Forest Land Management Plan (USDA 2019), hereafter referred to as the Forest Plan. Wilderness areas are designated by an act of Congress.

The project area includes most of the Big Muddy Creek Watershed and portions of the Sweet Creek Watershed. There are no lakes within the project area boundary, but Big Meadow Lake lies just outside the southwest corner of the area. Some extensive wetland complexes are associated with the major creeks in the area. Winter ranges for deer and elk occur on the lower elevations in the eastern portions of the project area.

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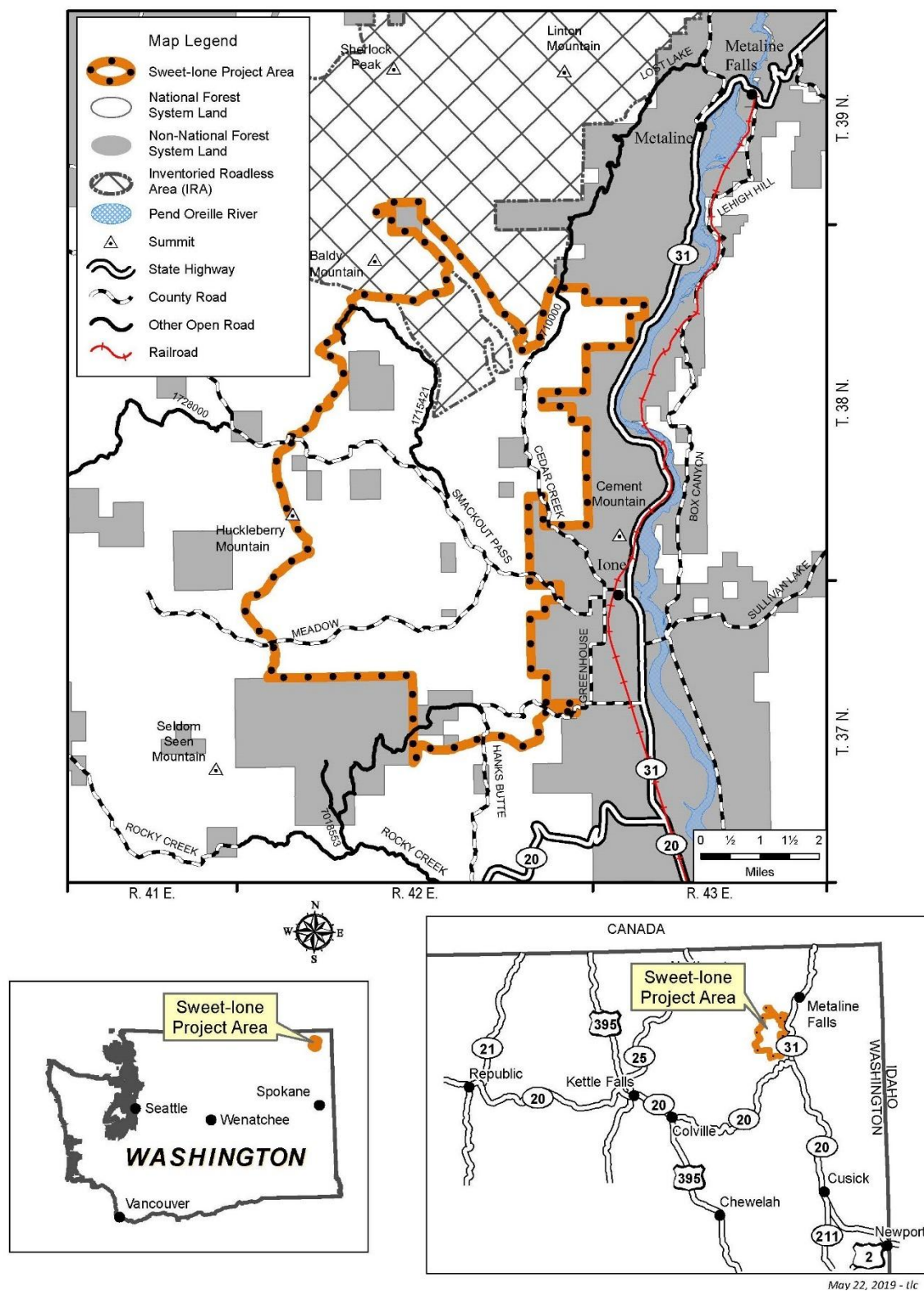


Figure 1. Sweet-Ione Project Area vicinity map

1.1.1 Forest Plan Management Areas

The Forest Plan divided the NFS lands within the administrative boundary of the forest into several different “Management Areas” (MAs). Each MA has its own management emphasis. The following table lists the land ownerships and various Forest Plan MAs within the Sweet-Ione Project Area. Note that “some MAs naturally overlap with other management areas. Combinations of activities or uses are dependent on site-specific conditions, making it unreasonable to include all combinations and the applicable plan direction within the Forest Plan. Therefore, applicability of plan direction is guided by the principle that, where management areas overlap, the most restrictive plan direction applies depending on site-specific conditions and the activity or use” (USDA 2019).

Table 1. Land ownership and CNF Forest Plan (2019) management areas in the Sweet-Ione Project Area

Ownership	Forest Plan management area	Management emphasis	Timber harvest permitted?	Approx. acres
National Forest System (NFS)	Backcountry	Provide non-motorized recreation opportunities, wildlife habitat	no, unless consistent with RACR ¹	1,530
NFS	Focused Restoration	Restore ecological integrity and ecosystem function	yes	5,825
NFS	General Restoration	All areas not included in another management area	yes	11,345
NFS	Scenic Byway	Protect scenic values and recreation use within 0.5 mile of the International Selkirk Loop	yes, in support of scenery mgt. objectives	165
NFS	Riparian Management Areas	Aquatic and riparian dependent resources	yes, in support of desired conditions	overlay with other MAs
Total NFS				18,865
Private, WA Dept. of Natural Res.	NA	timber production	according to WA Forest Practices	1,569
Project area				20,434

¹ Roadless Area Conservation Rule

As displayed in Table 1, most NFS lands in the project area lie within either the Focused Restoration or General Restoration MAs. Forest Plan direction specific to wildlife habitats in these MAs is mainly related to road densities, as described below.

MA-DC-FR-02 Habitat (page 106)

A desired condition of the Focused Restoration MA is to “contribute important habitat for plant, wildlife, and aquatic species that benefit from areas with a relatively low road density and high habitat effectiveness (relatively low level of human disturbances).”

MA-DC-FR-05 Travelways, Roads (page 107)

Road densities will vary across the Focused Restoration MA, but the desired condition is to have no more than 1 mile of drivable National Forest System (NFS) road per square mile of NFS lands.

MA-DC-GR-02 Habitat (page 109)

A desired condition of the General Restoration MA is to “contribute habitat for plant and animal species that are relatively tolerant of human activities and disturbances.

MA-DC-GR-05 Travelways, Roads (page 110)

Road densities will vary across the General Restoration MA, but the desired condition is to have no more than 2 miles of drivable NFS road per square mile of NFS lands.

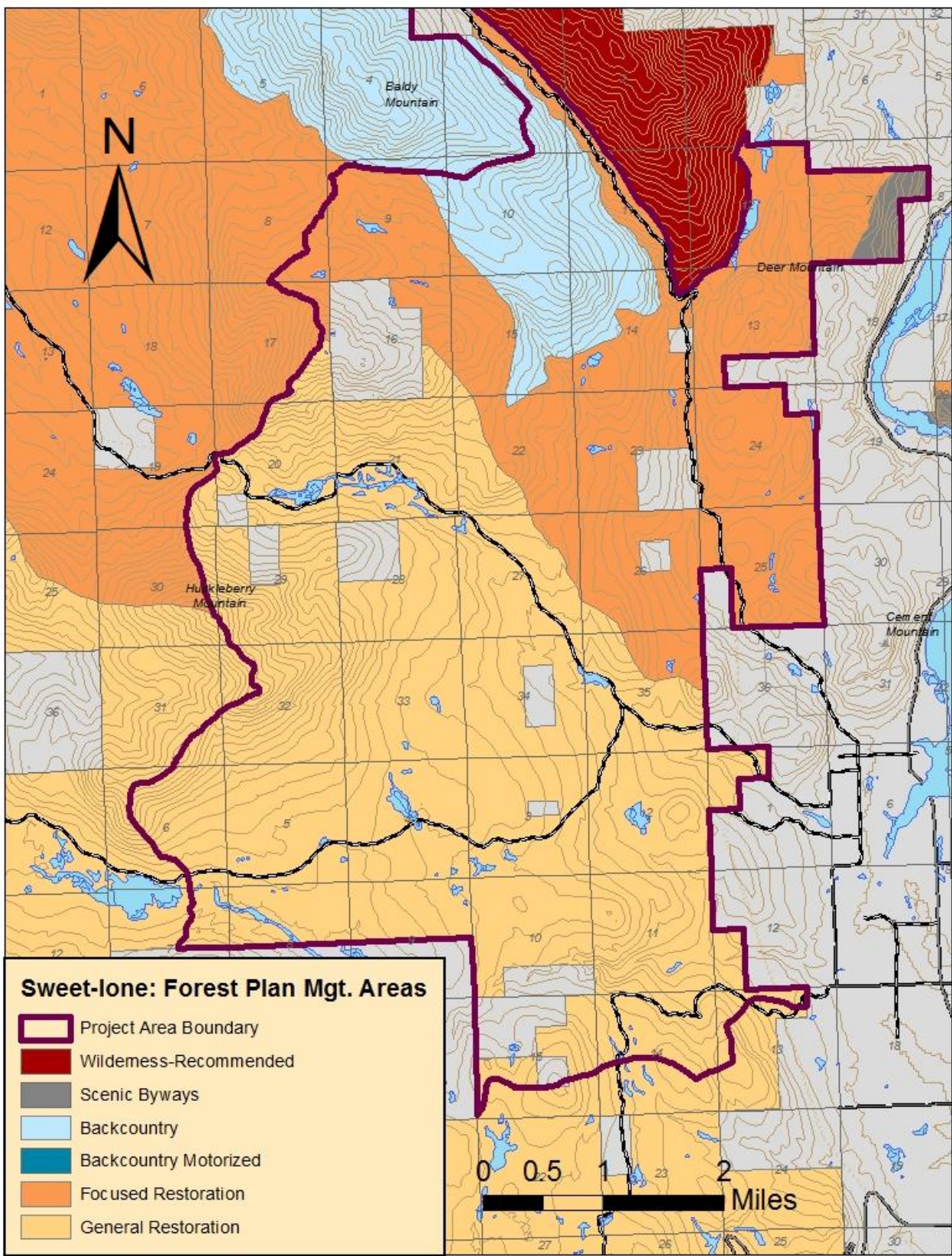


Figure 2. Sweet-Ione Project Area: 2019 Forest Plan management areas

1.1.2 Past Management Activity and Disturbance

Timber harvest occurred in the project area as far back as the late 1800s and early 1900s. Recorded harvest activities on National Forest System land from approximately 1987 to the present are identified in Table 2. As was the case elsewhere in the Intermountain West, human settlement (mostly of Euro-American descent) often altered the historic fire regime. There is limited mapping available regarding wildfire history in the Ione area prior to the 1980's. A fire history map is in the project record.

Table 2. Past commercial harvest activity on lands administered by the CNF in the Sweet-Ione Project Area

Harvest Prescription	Approximate Acres Harvested	% of Total Harvest
Clearcut (HCC)	2,735	30%
Seed Tree (HCR)	291	3%
Shelterwood (HSH)	4,714	52%
Commercial Thinning (HTH)	586	6%
Other (salvage, improvement thins, selection harvest)	777	9%
Total	9,103	100%

1.1.3 Current Vegetation

The Sweet-Ione Project Area is predominantly forested with often dense stands of conifers. Quaking aspen and paper birch are minor components of many timber stands. Patches of black cottonwoods occur along certain stream reaches and wetlands. Forest openings are predominantly the result of more recent timber harvest that removed most of the overstory trees. More permanent openings in the area include a few old homestead meadows that support mostly non-native grasses, and some small, open wetlands. There are also two power transmission line corridors bisecting the area. The utilities that own the power lines clear small trees from the corridors every 3-5 years.

1.1.3.1 Vegetation Types

The Forest Plan (Table 3, page 33) classifies forest vegetation into five vegetation types for the Colville National Forest, grouping similar plant associations together. Within the Sweet-Ione Project Area, Dry Douglas fir and Northern Rocky Mountains mixed conifers are by far the most prevalent vegetation types. Mesic Western redcedar / Western hemlock vegetation types occur in isolated pockets, mainly associated with drainages. Subalpine fir / Engelmann spruce and Subalpine fir / Lodgepole pine types occur in the highest elevations along the western and boundary of the project area.

Table 3. Vegetation Types in the Sweet-Ione Project Area (all values are approximate)

Vegetation Type	Acres	Percent
Douglas-fir Dry	8,011	39
Northern Rocky Mountain Mixed Conifer	10,285	50
Western redcedar / Western hemlock	1,829	9
Subalpine fir / Lodgepole pine	220	1
Spruce / Subalpine fir	100	0.5
Non-forested	0	0
Total	20,445	100

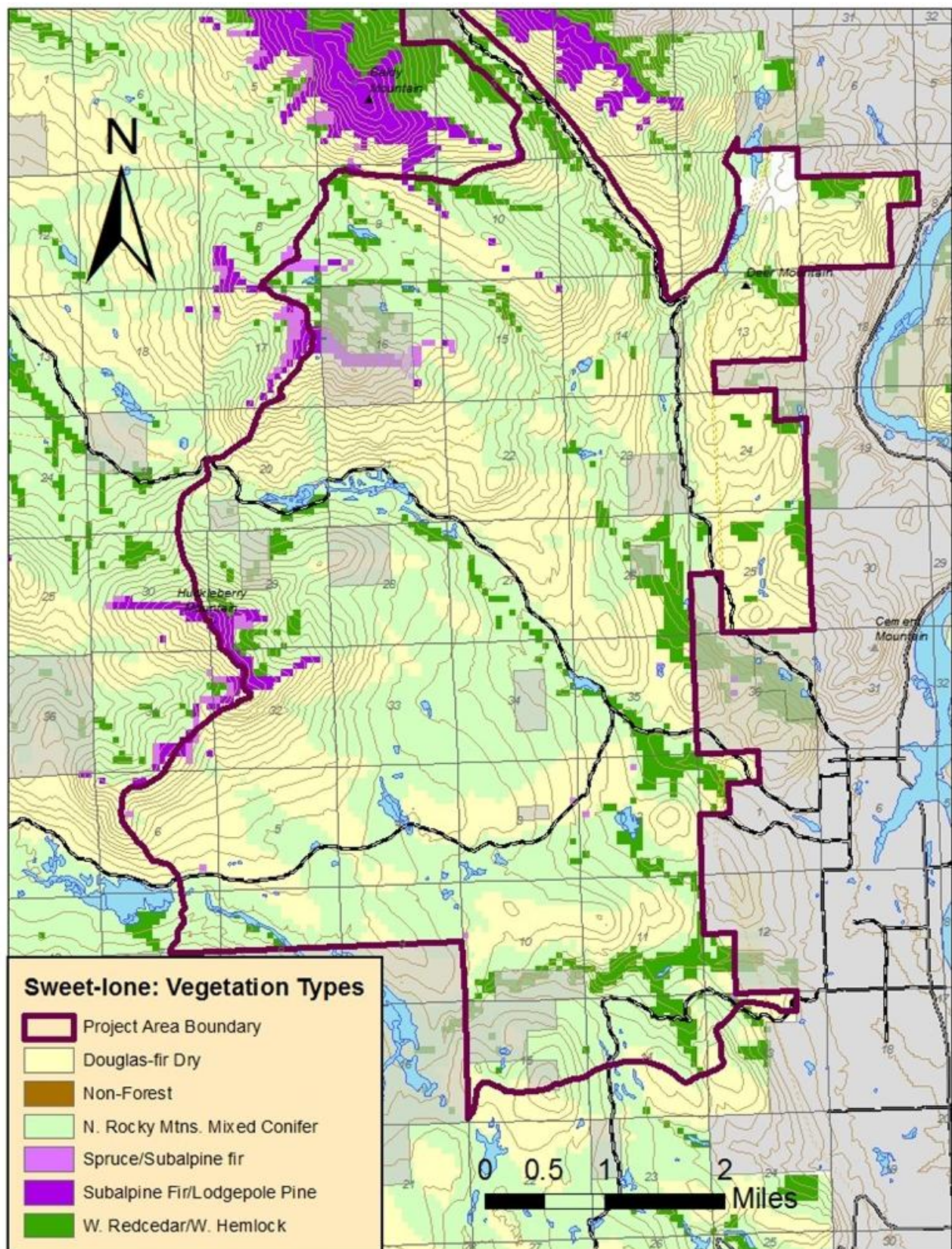
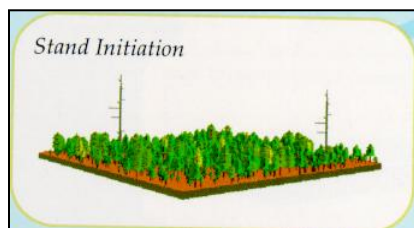


Figure 3. Sweet-Ione Project Area vegetation types

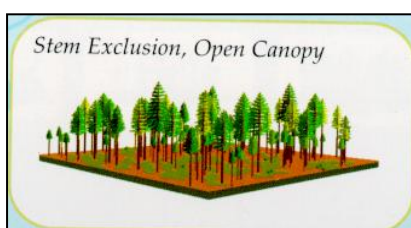
1.1.3.2 Stand Structural Stages

The Forest Plan (Table 4, page 33) identifies discrete stages of timber stand development ranging from early to late structure. Although the phrase “structural stage” implies a linear progression of stand development, forests do not necessarily follow a single pathway of vegetative change (forest succession) or attain a single stable condition (climax). Both natural and human disturbances have long-term influences on the composition of forests and on the successional pathways they follow. The following series of graphics depict points of structural stage (SS) development.

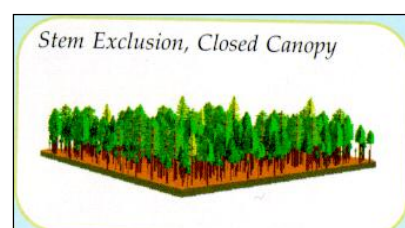
Early



Early or Middle Open



Early or Middle Closed

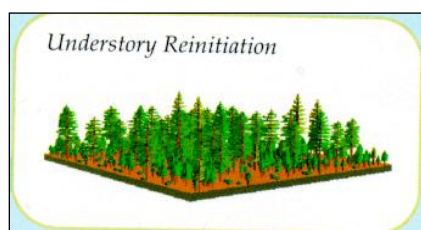


Early (SS1) - Trees < 10 inches in diameter OR canopy cover < 10 percent.

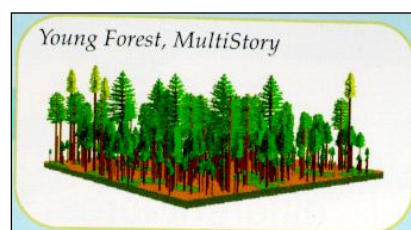
Middle Open Canopy (SS2) - Trees 10 to < 20 inches in diameter, canopy cover 10 to 40 percent.

Middle Closed Canopy (SS3) - Trees 10 to < 20 inches in diameter, canopy cover 40+ percent.

Middle Closed

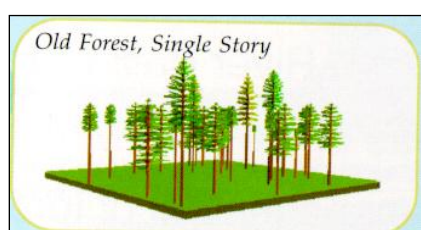


Middle Closed

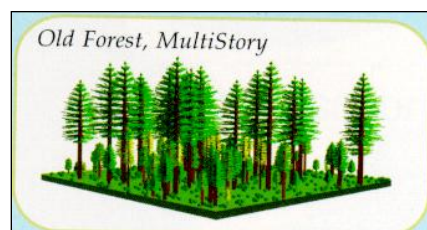


Middle Closed Canopy (SS3) - Trees 10 to < 20 inches in diameter, canopy cover 40+ percent.

Late Open



Late Closed



Late, Open Canopy (SS4). Typically, a single layer of large (20+ inch) trees is present in this late stage. The understory may be absent or may contain sparse or clumpy seedlings and saplings. These stands are often park-like in appearance. Canopy cover is 10 to 40 percent.

Late, Closed Canopy (SS5). This late structural stage contains two or more cohorts of trees, and trees of all sizes are present. The overstory canopy is discontinuous and dominated by large (20+ inch) trees. Canopy cover is 40+ percent.

Figure 4. Examples of the stand structural stages recognized for the Colville National Forest.



Non-forest (meadow)



Early stand structure (plantation)



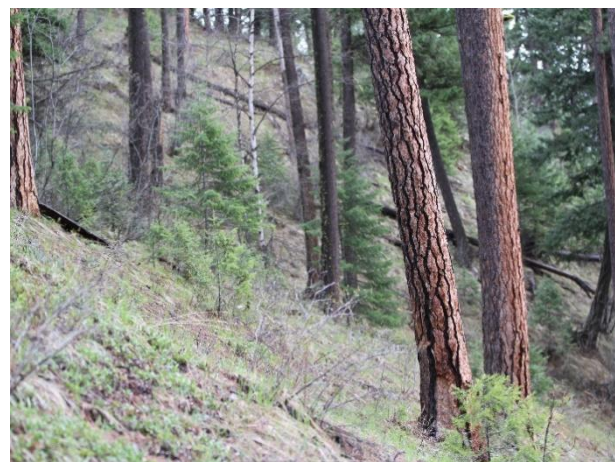
Mid-open stand structure



Mid-closed stand structure



Late closed stand structure



Late open stand structure

Forest Plan Desired Condition *FW-DC-VEG-03* (page 34) is for forest structure across the forest to be commensurate with the “historic range of variability” (HRV) for each of the five vegetation types (Forest Plan Table 5, page 35). The HRV is an estimate of the percentage range of each stand structural stage that existed during pre-settlement times. The following tables compare the historic stand structural stage levels on the forest to the current condition of NFS lands in the Big Muddy and Sweet Creek Watersheds (Napier 2019).

Table 4. Big Muddy Creek Watershed: comparison of current structural stage levels with historic conditions.

Vegetation Type		Early	Mid Open	Mid Closed	Late Open	Late Closed
Douglas fir dry	Current (%)	3.7	5.2	67.4	0.8	22.9
	Historic (%)	6-16	2-8	4-13	38-78	1-32
Northern Rocky Mountain Mixed Conifers	Current (%)	5	1.8	54.6	0.1	38.5
	Historic (%)	9-25	1-3	18-30	4-6	44-60
Western redcedar / western hemlock	Current (%)	8.2	1.1	54.4	0.4	35.9
	Historic (%)	4-24	0	7-27	0	55-83
Subalpine fir / Lodgepole pine	Current (%)	14.2	5.4	72.3	0.1	7.9
	Historic (%)	45-65	0	33-53	0	3
Spruce/ Subalpine fir	Current (%)	15.1	1.9	67.9	0.1	15
	Historic (%)	14-46	0	13-41	0	29-57

Table 5. Sweet Creek Watershed (west of the Pend Oreille River): comparison of current structural stage levels with historic conditions.

Vegetation Type		Early	Mid Open	Mid Closed	Late Open	Late Closed
Douglas fir dry	Current (%)	5.3	5.7	57.5	0.7	30.7
	Historic (%)	6-16	2-8	4-13	38-78	1-32
Northern Rocky Mountain Mixed Conifer	Current (%)	5.6	2.6	65.2	0.5	26.1
	Historic (%)	9-25	1-3	18-30	4-6	44-60
Western redcedar / western hemlock	Current (%)	0	2.8	39	0	58.3
	Historic (%)	4-24	0	7-27	0	55-83

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Vegetation Type		Early	Mid Open	Mid Closed	Late Open	Late Closed
Subalpine fir / Lodgepole pine	Current (%)	0	2	58.1	0	40
	Historic (%)	45-65	0	33-53	0	3
Spruce/ Subalpine fir	Current (%)	0.8	3.3	79.3	0	16.6
	Historic (%)	14-46	0	13-41	0	29-57

As shown in the preceding tables, most vegetation types on NFS lands in the watersheds are below their historic range for early stand structure. There is a large surplus of stands in the mid-closed structural stage relative to historic conditions. Late open structure is well below historic levels in the drier vegetation types. Late closed structure is often below historic levels. These departures from HRV are likely the result of several factors including those described below.

- Many decades of aggressive fire suppression policies led to the “in-fill” of young trees and increases in stand densities.
- Timber harvest from the late 19th century through most of the 20th century focused on the largest trees of the most valuable species (e.g., western larch, Douglas fir, western white pine, ponderosa pine).
- Mature western white pine trees were greatly reduced in number on a region-wide scale due to blister rust, a pathogen introduced from Europe to North America in the early 20th century.

1.1.3.3 Biological Legacies

Forest Plan Desired Condition *FW-DC-VEG-05* (page 37) is to ensure that biological legacies such as large trees, snags, and coarse woody debris are maintained across the forest to support wildlife, aquatic, and soil resources. Within the Big Muddy and Sweet Creek Watersheds, there are approximately 3,113 acres of stands we mapped as mid-late-closed focal species habitat (see Figure 8). These stands have varying concentrations of biological legacies. There are also a few hundred acres of open canopy stands in the Douglas fir Dry Vegetation Type that contain some large diameter trees.

1.1.4 Existing Transportation System

The following table displays the miles of roads within the Sweet-Ione Project Area. We mapped approximately eight (8) miles of unauthorized roads in this project area based mainly on LiDAR imagery. These routes have revegetated to one degree or another, but some appear to be used by off-highway vehicle (OHV) riders that originate from the nearby town of Ione. Thus, we classified these routes as open, motorized routes.

Table 6: Sweet-Ione Project Area - existing transportation system data

(Project area = 31.9 square miles)

Open routes	Approximate miles	Route density (mi. / sq. mile)
National Forest System roads	53.5	1.68
county roads	19.8	0.62
private roads	2.7	0.08

Open routes	Approximate miles	Route density (mi. / sq. mile)
unauthorized roads / OHV trails	8.0	0.25
Total open routes	84	2.63
Restricted access roads		
gated roads with some administrative traffic but no authorized public use	25.9	0.81
Total drivable routes		
open + restricted routes	109.9	3.45
Un-drivable routes		
roads effectively closed with guardrail barricades, earthen berms, boulders, or brush with no vehicle traffic evident	0.7	0.02

1.1.4.1 Motor Vehicle Use Maps

The CNF published the first Motor Vehicle Use Maps (MVUMs) for the forest's transportation system in 2005. These maps display roads and trails that are designated open to motorized travel, and the types of vehicles permitted on each route. If a route is not open to motorized vehicles, it does not appear on the map. Off-road travel is now prohibited on the CNF, except to access established, dispersed campsites within 300 feet of an open road. Off-road travel for game retrieval is not allowed. MVUMs are free of charge and hundreds of copies have been distributed to the public through the CNF offices, law enforcement officers, and other Forest Service employees in the field. Within the Sweet-Ione Project Area, several routes are open to off-highway vehicles (OHVs) as shown on the MVUMs.

2.0 Proposed Action

The project would be primarily designed to:

- Reduce understory fuels and continuous fuel ladders. Restore fire to its historic function across the landscape.
- Reduce wildfire risk to local communities and surrounding private lands.
- Reduce susceptibility / increase resiliency of trees to insect and disease attack by reducing stand densities.
- Restore early seral tree species (ponderosa pine, western larch, western white pine) that have been reduced by historic over-harvest, fire suppression, and white pine blister rust.
- Move the area closer to its Historic Range of Variability (HRV) for stand structural stages.
- Decrease the high road densities in the project area to reduce road maintenance costs, improve in-stream water quality and riparian habitats, and increase seclusion for elk and other wildlife.
- Restore habitats for aquatic wildlife and improve hydrologic function.

2.1 Vegetation Management

The following tables display the vegetation management activities proposed with the Sweet-Ione project.

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Table 7: Proposed commercial timber harvest (all values are approximate)

Harvest Prescriptions	Total Acres	Comments
Shelterwood	1,240	Harvest all trees except about 12-25 trees per acre. Generally, retain the largest, most vigorous appearing trees to provide a seed source, shelter for existing regeneration, and wildlife habitat. The intent of this prescription is to establish a two-aged stand of the most desirable species for the site. Most of the overhead tree canopy would be removed (created openings). Where there is a lack of natural regeneration or desirable seed trees post-harvest, plant these areas with trees grown at the nursery.
Commercial thin	3,505	Thin out the stand focusing on removing the suppressed and less vigorous appearing trees with the smallest crowns. Increase the growing space for the largest and most vigorous appearing trees, thereby accelerating their growth and moving the stand towards a late structural stage. Overhead canopy closure would be reduced for perhaps 15-20 years, until growing tree crowns fill in the canopy gaps.
Mixed harvest	3,135	Harvest using both shelterwood (approx. 60%) and thinning (approx. 40%) prescriptions, depending on within-stand conditions.
Total Acres	7,880	All values are approximate Expected timber volume = 40-60 million board feet (MMBF)

Table 8. Proposed commercial logging

Logging Systems	Total Acres	Comments
Ground based (tractor)	7,815	Cut trees with chainsaws or with tree shearing equipment. Drag trees to a landing site using track-mounted or rubber tire skidders. This method is usually used on slopes less than 40 percent.
Skyline	65	Move cut trees to a landing using a suspended cable attached to a mobile tower parked on a road. This method is used on slopes greater than 40 percent.
Total Acres	7,880	All values are approximate

Table 9. Proposed non-commercial vegetation treatments (all values are approximate)

Fuels Treatments	Acres	Comments
Grapple pile and burn piles	5,335	Machine pile logging slash within commercial harvest units to reduce fuel loads that exceed objectives for large woody material and soil productivity. Piles are often burned.
Grapple pile, burn piles, then under burn	385	Same as above, followed by under burning.
Under-burn within harvest units	2,160	Use prescribed fire to reduce logging slash, remove undesirable regeneration, promote the growth of fire-adapted tree species, and rejuvenate grasses and desirable browse species for wildlife.
Total Acres	7,880	All values are approximate
Other Vegetation	Total	Comments

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Treatments	Acres	
Pre-commercial thin Prune white pine trees	890	Thin seedling to small pole-sized trees (typically < 7 inches in diameter) to a set spacing (typically 12 feet) and by species priority. Hand pile slash and burn piles. Remove the lower branches of young western white pine trees (no greater than 1/3 the total height of the tree) to reduce the potential for white pine blister rust infection. Treatments would occur on approximately 575 acres outside of harvest units and 315 acres within harvest units. If necessary, the cut trees and branches would be piled. Piles might be burned.
Fall whips	3,380	Remove undesirable seedling to small pole-sized trees to release desirable regeneration and enhance huckleberry patches. Treatments would occur within harvest units and in areas proposed for under-burning outside harvest units.
Plant trees	3,400	Re-establish trees through planting in openings created by timber harvest, in forest openings created by insect and disease attack, along stream corridors (425 acres) where needed to increase shading or long-term coarse wood recruitment, on decommissioned roads, and on closed road entrances.
Under-burn outside harvest units	865	Use prescribed fire to reduce the risk of uncharacteristic wildfires. The intent would be to reduce surface fuels, stand understories and fuel ladders; raise the live crowns of overstory trees; promote the growth of fire-adapted tree species; and rejuvenate grasses and desirable browse species for wildlife.
Aquatic wood source units	355	Selectively thin trees 12+ inches in diameter to be placed in streams to improve habitat complexity. Trees could be cut and moved to the stream or felled directly into the stream. In some cases, root wads would remain intact. Canopy closure at the stand level should not be affected.
Total Acres	8,890	All values are approximate.

Post-harvest Stand Structural Stages

The following tables compare the current stand structural stage mix on NFS lands in the Big Muddy and Sweet Creek Watersheds with the structural stage mix resulting from timber harvest that would occur with the Proposed Action.

Table 10. Big Muddy Creek Watershed: comparison of stand structural stage levels.

Vegetation Type		Early	Mid Open	Mid Closed	Late Open	Late Closed
Douglas fir dry	Current (%)	3.7	5.2	67.4	0.8	22.9
	Proposed Action (%)	3.7	34.6	38	2.7	21
	<i>Historic (%)</i>	<i>6-16</i>	<i>2-8</i>	<i>4-13</i>	<i>38-78</i>	<i>1-32</i>
Northern Rocky Mountain Mixed Conifer	Current (%)	5	1.8	54.6	0.1	38.5
	Proposed Action (%)	5	24.3	32.1	0.5	38.1
	<i>Historic (%)</i>	<i>9-25</i>	<i>1-3</i>	<i>18-30</i>	<i>4-6</i>	<i>44-60</i>

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Vegetation Type		Early	Mid Open	Mid Closed	Late Open	Late Closed
Western redcedar / western hemlock	Current (%)	8.2	1.1	54.4	0.4	35.9
	Proposed Action (%)	8.2	12.8	42.8	0.4	35.9
	<i>Historic (%)</i>	<i>4-24</i>	<i>0</i>	<i>7-27</i>	<i>0</i>	<i>55-83</i>
Subalpine fir / lodgepole pine	Current (%)	14.2	5.4	72.3	0.1	7.9
	Proposed Action (%)	14.2	8.2	69.5	0.1	7.9
	<i>Historic (%)</i>	<i>45-65</i>	<i>0</i>	<i>33-53</i>	<i>0</i>	<i>3</i>
Spruce / Subalpine fir	Current (%)	15.1	1.9	67.9	0.1	15
	Proposed Action (%)	15.1	16.6	53.2	0.1	15
	<i>Historic (%)</i>	<i>14-46</i>	<i>0</i>	<i>13-41</i>	<i>0</i>	<i>29-57</i>

With the Proposed Action, most timber harvest in the Big Muddy Creek Watershed would occur in mid-closed structural stage stands which are presently well above historic levels in the watersheds. Timber harvest would convert these stands to the mid-open structural stage. Approximately 2 percent of the late closed structural stage stands in the dry Douglas fir Vegetation Type in each watershed would be harvested. Timber harvest would convert these stands to the late open structural stage, which is presently well below historic levels in the watersheds.

Table 11. Sweet Creek Watershed (west of the Pend Oreille River): comparison of stand structural stage levels.

Vegetation Type		Early	Mid Open	Mid Closed	Late Open	Late Closed
Douglas fir dry	Current (%)	5.3	5.7	57.5	0.7	30.7
	Proposed Action (%)	5.3	24.2	39	2.8	28.6
	<i>Historic (%)</i>	<i>6-16</i>	<i>2-8</i>	<i>4-13</i>	<i>38-78</i>	<i>1-32</i>
Northern Rocky Mountain Mixed Conifer	Current (%)	5.6	2.6	65.2	0.5	26.1
	Proposed Action (%)	5.6	29.2	38.6	0.4	26.1
	<i>Historic (%)</i>	<i>9-25</i>	<i>1-3</i>	<i>18-30</i>	<i>4-6</i>	<i>44-60</i>

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Vegetation Type		Early	Mid Open	Mid Closed	Late Open	Late Closed
Western redcedar / western hemlock	Current (%)	0	2.8	39	0	58.3
	Proposed Action (%)	0	5.1	36.7	0	58.3
	Historic (%)	4-24	0	7-27	0	55-83
Subalpine fir / Lodgepole pine	Current (%)	0	2	58.1	0	40
	Proposed Action (%)	0	7.6	52.1	0	40
	Historic (%)	45-65	0	33-53	0	3
Spruce / Subalpine fir	Current (%)	0.8	3.3	79.3	0	16.6
	Proposed Action (%)	0.8	3.3	79.3	0	16.6
	Historic (%)	14-46	0	13-41	0	29-57

With the Proposed Action, most timber harvest in the Sweet Creek Watershed would occur in mid-closed structural stage stands which are presently well above historic levels in the watersheds. Timber harvest would convert these stands to the mid-open structural stage. Approximately 2 percent of the late closed structural stage stands in the dry Douglas fir Vegetation Type in each watershed would be harvested. Timber harvest would convert these stands to the late open structural stage, which is presently well below historic levels in the watersheds.

2.1.1 Road Management

Table 12 displays the work proposed on the transportation system in the project area.

Table 12: Sweet-Ione Project Area – Proposed road and trail work (all values are approximate)

Proposed Road Work	Length (miles)	Comments
Build new temporary roads to complete forest management activities	8.0	Use old road templates, old skid trails, and other previously impacted areas to the fullest extent possible. Keep closed to public (motorized) use with gates or other means. Following their use, render the roads un-drivable with native materials (ex., earthen berms / boulders / plantings).
Close existing open NFS roads	3.5	Close to public (motorized) use with gates or other means. For those roads which access NFS lands only, replace gates with earthen berms / boulders installed on the road entrance, post-project.

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Proposed Road Work	Length (miles)	Comments
Decommission existing roads	9.0	These road segments may include currently open or closed roads. They are not necessary for future forest management and are often potential sources of sediment input to streams. Render the roads un-drivable with native materials. Remove from the CNF's Transportation System.
Net change in open NFS road miles	- 5	Change in existing NFS open road miles
Obliterate unauthorized roads / OHV trails	- 8.0	Render these routes un-drivable using native materials.
Net change in open motorized route miles	- 13.0	Change in total miles physically open to motorized use.
Allow off-highway vehicle (OHV) use on a road presently open to highway legal vehicles only	1.5	Change the status of FR 1715421 from its intersection with FR 1715422 to its intersection with FR 1715370, on the Motor Vehicle Use Map.
Smackout Gravel Pit	up to 5 acres	Construct a gravel pit to provide materials for road work. Stockpile soils on site to be used for future reclamation.

We do not propose further reductions in the drivable road miles in the Sweet-Ione Project Area for the following reasons:

- The Forest Service has no jurisdiction over state, county, or privately owned roads in the area.
- We are required to provide reasonable (i.e., road) access to private in-holdings per the Alaskan Native Interest Lands Conservation Act.
- The Bonneville Power Administration and Pend Oreille County Public Utility District #1 require road access to service power transmission line infrastructure and maintain power line corridors.
- The US Air Force desires continued open road access on specific roads for their Survival School training exercises.
- Access on arterial and collector roads is also needed / desired for forest recreation, special forest products collection (ex., firewood), and range allotment permit administration.

2.1.2 Habitat Improvements

The following table displays the work proposed to improve or restore terrestrial or aquatic habitats in the project area, and to improve hydrologic function.

Table 13: Sweet-Ione Project Area – Proposed habitat restoration / improvements (all values are approximate)

Proposed Aquatic / Watershed Restoration Treatments	Units	Comments
Place large woody debris in streams	12 miles	Within large woody Material Placement (LWM) units, utilize cut trees to increase in-stream cover and habitat complexity. Wood may be imported, or trees could be felled on-site for placement in streams.
Remove or upgrade culverts	25 culverts	Remove or upgrade structures that are impeding aquatic organism passage in streams

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Proposed Aquatic / Watershed Restoration Treatments	Units	Comments
Remove log crib dam	1 structure	Intended to restore in-stream channel function.
Proposed Terrestrial Habitat Improvements	Units	Comments
Maintain / restore meadows	5 acres	Maintain or improve early seral meadow habitat through a variety of actions such as small conifer thinning / removal and plantings.
Create den / rest sites for rare carnivores	3 structures	On the lynx range, provide micro-sites of concealing cover for lynx and other rare forest carnivores. Pile at least 3-5 layers of larger (9-14 inch) down logs crisscrossed or lain lengthwise in triangular groupings of 3 logs. Cover the top with a few layers (about 2-3 feet) of branches and other small material.
Create snags post-project	TBD	If post-harvest snag levels in created openings (ex. shelterwood) do not meet those prescribed in Table 7 the Forest Plan (Page 36), top live green trees to create snags to mimic habitat levels in unmanaged stands. Consider topping groupings of trees, particularly in the Lodgepole Pine and Montane Mixed Conifers habitat types.

DRAFT Sweet-lone EA - Veg Treatments DRAFT

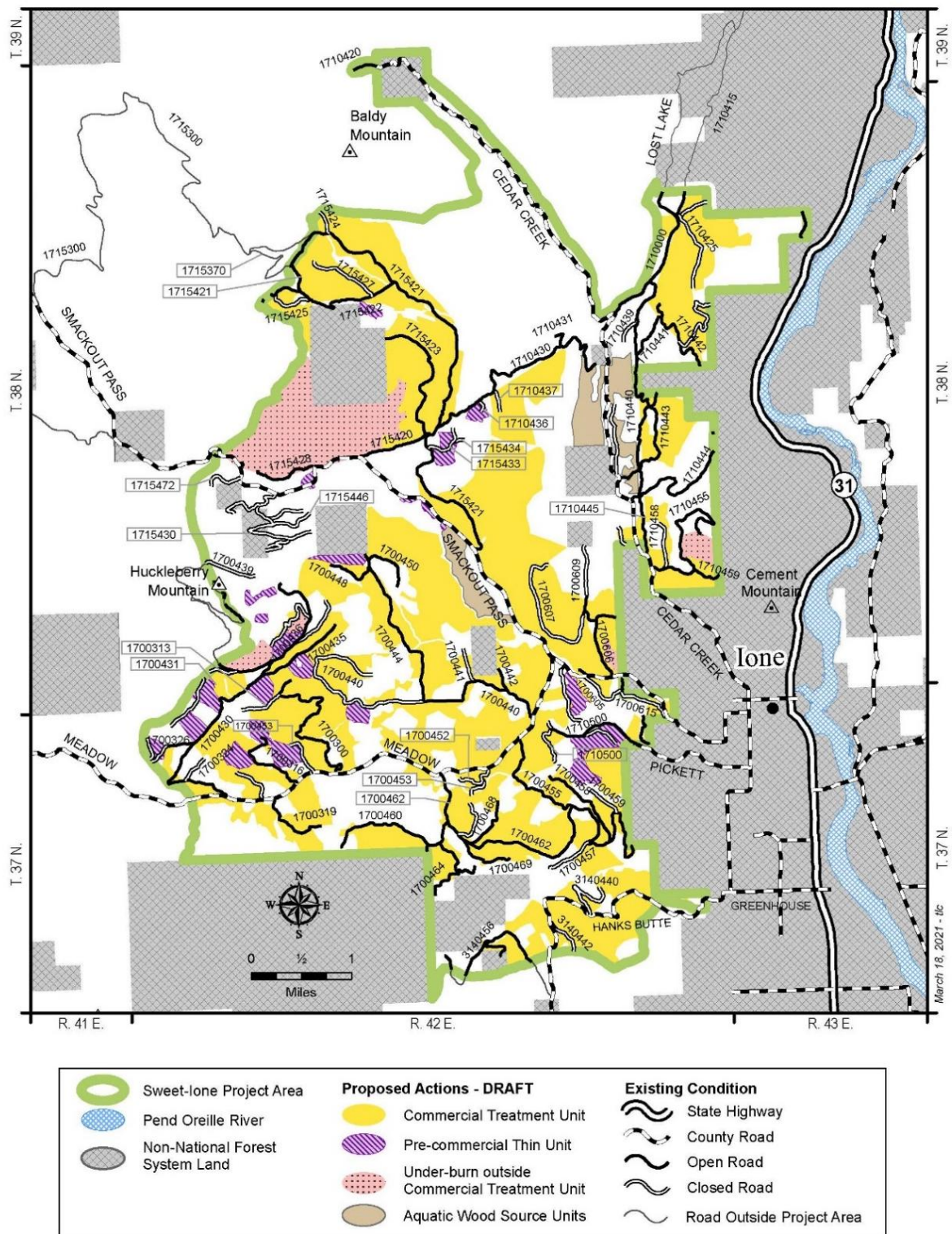


Figure 5. Proposed vegetation treatments

DRAFT Sweet-Ione EA - Aquatics and Roads DRAFT

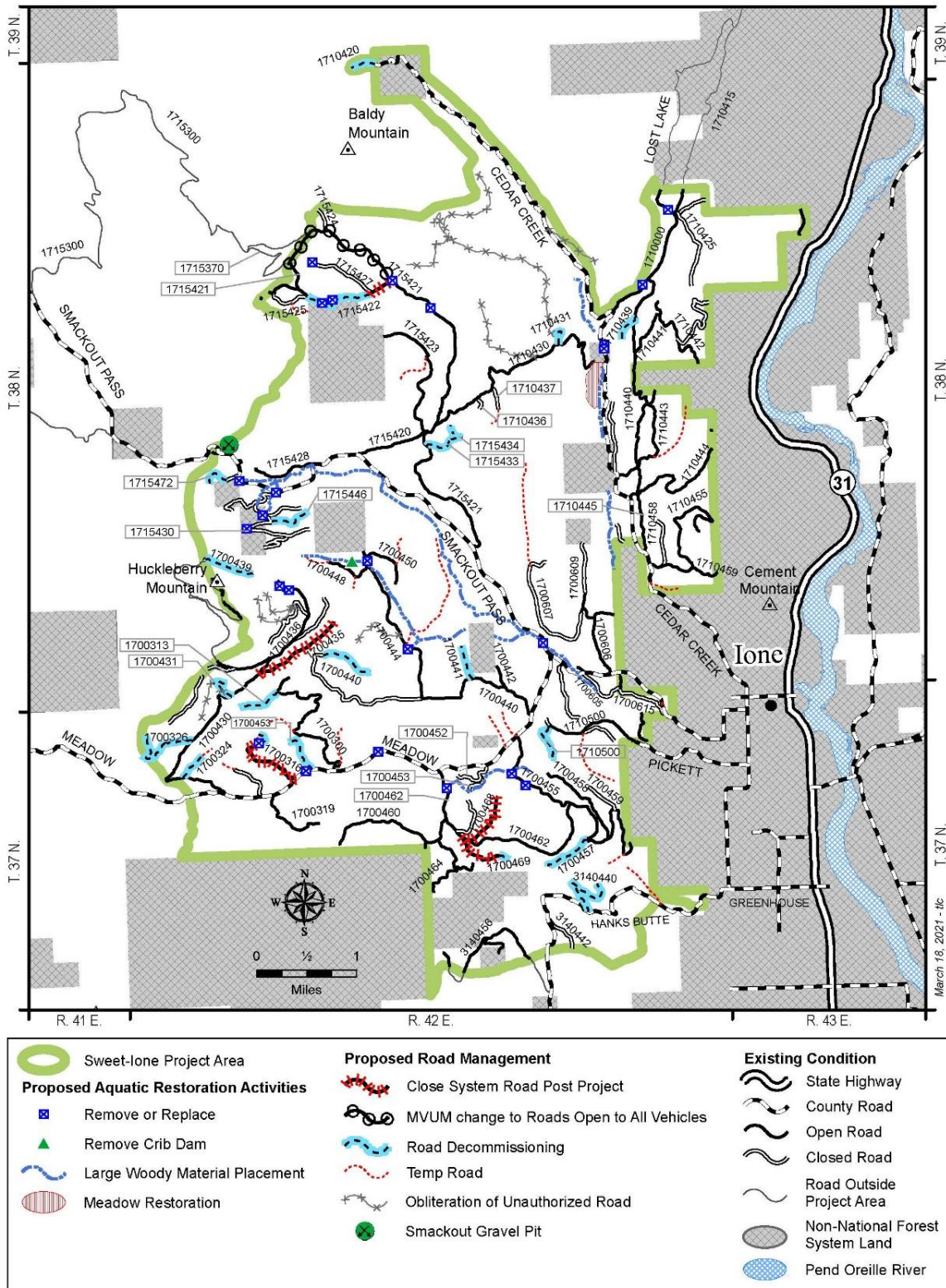


Figure 6. Proposed road management and habitat improvements

2.1.3 Wildlife Standard Practices and Design Elements

Wildlife standard practices are those we have consistently applied with our forest management projects to conserve wildlife habitats. They are often focused on fine-scale habitats (ex., large snags) that are found in most, if not all activity areas of a project. These would be best identified on the ground by forest workers during project preparation (ex., harvest unit layout, tree marking), or implementation. Other standard practices pertain to maintaining canopy closure in riparian management areas (RMAs), and the management of the road system during and after the project.

Wildlife design elements may change from project to project, and normally apply to specific project activity areas. They may be intended to protect wildlife from human disturbance, or to conserve known biological sites or areas (ex., raptor nest stands). Design elements may also be intended to mitigate for potential project impacts to specific habitats.

Criteria in Table 14 and Table 15 would be incorporated into the design of the Proposed Action. These practices have proven to be effective in avoiding or minimizing the potential negative effects of vegetation management projects to native wildlife species on the forest.

Table 14. Standard practices for terrestrial wildlife. These practices would apply to all project activity areas that contain these features.

Standard Practice	Forest Plan Desired Condition (DC), Standard (STD), Guideline (GDL), and Selected Supporting Documents
Newly Discovered TES Species and Biological Sites If a threatened, endangered, or sensitive wildlife species is observed in the project area, or if a previously unknown wildlife activity site (e.g., raptor nest, large carnivore den, cave, mine) is discovered, consult the district wildlife biologist on measures that might be necessary to protect the species or site.	<i>FW-DC-WL-11. Human Activities in Bald Eagle Nesting Areas</i> (page 60) <i>FW-STD-WL-01. Nest Sites</i> (page 62) <i>FW-GDL-WL-03. Unique Habitats</i> (page 64) <i>FW-GDL-WL-16. Bat Habitat Protection</i> (page 66) <i>FW-GDL-WL-18. Nest Sites</i> (page 66) <i>FW-GDL-WL-19. Northern Goshawk Nesting Sites</i> (page 67) Standard FS timber sale contract clause B6.24
Large Live Trees If live trees 20+ inches in diameter at breast height (DBH) are proposed for harvest, provide clear rationale as to why the removal of smaller trees alone cannot achieve the stated desired conditions.	<i>FW-DC-VEG-05. Biological Legacies</i> (page 37) <i>FW-GDL-VEG-03. Large Tree Management</i> (page 41-42)
Hardwoods Retain hardwood trees except those that must be cut down within new road or equipment corridors, log landings, or for worker safety.	<i>FW-DC-VEG-01. Plant Species Composition</i> (page 34) <i>FW-GDL-WL-03. Unique Habitats</i> (page 64) Altman and Bresson 2017, Bull et al. 1997, USDI 2008

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Standard Practice	Forest Plan Desired Condition (DC), Standard (STD), Guideline (GDL), and Selected Supporting Documents
<p>Snags and Coarse Woody Debris</p> <p>Retain snags that are 10+ inches DBH except those that must be felled within new road or equipment corridors, log landings, or for worker safety. When trees must be felled, retain all 14+ inch bole pieces on site to contribute to down log levels, as feasible.</p> <p>Retain existing down logs that are 14+ inches at the large end, in 33+ foot pieces. Retain additional logs to meet the desired levels of coarse woody debris in the Forest Plan (see the Dead Wood Habitats section of this report).</p>	<p><i>FW-DC-VEG-05. Biological Legacies</i> (page 37)</p> <p><i>FW-DC-VEG-04. Snags and Coarse Woody Debris</i> (page 36)</p> <p><i>FW-STD-WL-12. Large Snag Habitat</i> (page 64)</p> <p>Altman and Bresson 2017, Bull et al. 1997, Gervais 2015, Mellen-McLean et al. 2017</p>
Standard Practice (continued)	Forest Plan Desired Condition (DC), Standard (STD), Guideline (GDL), and Selected Supporting Documents
<p>Biological Legacies</p> <p>Retain up to 12 live trees per acre (14+ inches DBH) from the following list:</p> <ul style="list-style-type: none"> - hollow trees (grand fir, western larch, western redcedar), - trees with broken tops, dead tops, or heart rot fungi such as Indian paint, - trees with woodpecker cavities / excavations, - trees with broom rusts (spruce, subalpine fir, grand fir), Elytroderma brooms (ponderosa pine), or dwarf mistletoes (western larch, Douglas fir), - open grown “wolf trees” with spreading crowns. 	<p><i>FW-DC-VEG-05. Biological Legacies</i> (page 37)</p> <p>Bull et al. 1997, Mellen-McLean et al. 2017</p>
<p>Riparian Management Areas (RMAs)</p> <p>Complete timber harvest and other vegetation treatments within RMAs <i>only</i> as necessary to attain desired conditions for aquatic and riparian resources. If treatments are proposed within RMAs, ensure that a high degree of overhead canopy (60+ percent target) is maintained within the moist vegetation types, averaged over that portion of a unit within the RMA.</p> <p>Maximum RMA widths are provided on pages 119-120 of the Forest Plan.</p>	<p><i>FW-DC-WR-01. Natural Disturbance Regime of Aquatic and Riparian Systems</i> (page 50).</p> <p><i>FW-DC-WR-02. Hydrologic and Aquatic and Riparian Habitat Connectivity</i> (page 50).</p> <p><i>FW-GDL-WL-03. Unique Habitats</i> (page 64)</p> <p><i>MA-STD-RMA-03. Timber Harvest and Thinning</i> (page 121)</p> <p>Altman and Bresson 2017, Duncan 2008, Foltz-Jordan, 2010 & 2011, Gervais 2015</p>

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Standard Practice	Forest Plan Desired Condition (DC), Standard (STD), Guideline (GDL), and Selected Supporting Documents
<p>Roads</p> <p>During the project, use gates or other means to prohibit unauthorized vehicle access on existing restricted (gated) roads, temporary roads, and presently un-drivable roads made drivable.</p> <p>As soon as possible following their use, close new roads, brushed-out roads, and selected open roads with gates or native materials (ex., earthen berms).</p> <p>Monitor all closed roads for 5 years. If a road is receiving unauthorized motorized use, implement actions necessary to improve the effectiveness of the closure.</p>	<p><i>FW-DC-WL-14. Deer and Elk Habitat – Human Activities</i> (page 60)</p> <p><i>FW-DC-WL-10. Risk Factors for all Surrogate Species</i> (page 60)</p> <p>Christensen et al. 1993, Rowland et al. 2005, Trombulak and Frissell 2000</p>
<p>Roadside Hiding Cover</p> <p>Hiding cover is defined as vegetation or topography capable of concealing 90 percent of an elk at 200 feet.</p> <p>Where the opportunity exists, retain strips / patches of shrubs and trees to provide hiding cover along open roads adjacent to created openings (shelterwood and mixed harvest units). To the extent feasible, maintain this cover during post-harvest activities.</p>	<p><i>FW-GDL-WL-01. Hiding Cover for Wildlife</i> (page 64)</p> <p>Thomas et al. 1979, USDI et al. 1986, Montgomery et al. 2013</p>

Table 15. Project Design Elements for terrestrial wildlife. These practices would apply to the identified locations.

Design Element	Applicable Locations	Forest Plan Desired Condition (DC), Standard (STD), Guideline (GDL), and Selected Supporting Documents
<p>Late-Closed Associated Species Habitat</p> <p>Retain sufficient habitat (unmanaged) to remain within HRV in the watersheds. There is an opportunity to thin selected habitat polygons in the Big Muddy Creek Watershed to improve stand health and tree growth. Retain 50+% canopy closure, averaged over the unit.</p>	<p>Units 135, 151, 164, 179, 188</p>	<p><i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> (page 59)</p> <p><i>FW-GDL-19. Northern Goshawk Nesting Sites</i> (page 67)</p> <p>McGrath et al. 2003, Moser and Garton 2009</p>
<p>Lynx Habitat</p> <p>Unless they are at risk of being lost to insects, disease, or senescence, retain patches of multi-storied trees as uncut “skips” in the identified units.</p> <p>Retain hiding cover on the ridge making up the western edge of Unit 1 to facilitate movement along the ridge, in consultation with the biologist.</p>	<p>Unit 1, and those portions of Units 2, 3, 6 which overlap the lynx range</p>	<p><i>FW-DC-WL-02. Habitat Conditions for Threatened and Endangered Species</i>, (page 59)</p> <p>Interagency Lynx Biology Team 2013</p>

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Design Element	Applicable Locations	Forest Plan Desired Condition (DC), Standard (STD), Guideline (GDL), and Selected Supporting Documents
Raptor Nest Timing Restriction Do not conduct project activities within 0.25 mile of active goshawk nests from March 1 to August 31, to avoid disturbance to birds during this critical period. This measure would apply to timber harvest, pre-commercial thinning, road construction and reconstruction, prescribed burning, mechanical fuels treatments, and other projects involving persistent heavy equipment operation. This measure would not apply to use of roads open to the public (i.e., for timber hauling) or to routine road maintenance / light reconstruction.	Units 135, 141, 142, temp road into Unit 41	<i>FW-STD-WL-01. Nest Sites</i> (page 62) McGrath et al. 2003, Moser and Garton 2009
Winter Range Timing Restriction To provide adequate seclusion habitat for wintering big game, conduct no project activities between December 1 and March 31 in the identified units.	Cedar Creek: Units 11, 12, 13, 14, 19, 20, 21, 22, 25, 26, 27 Big Muddy Creek: Units 72, 73, 76, 77, 79	<i>FW-DC-WL-14. Deer and Elk Habitat – Human Activities</i> (page 60) <i>FW-GDL-WL-13 Mule Deer, White-tailed Deer, and Elk Habitat – Human Activities</i> (page 66)
Snag Creation If post-harvest snag levels in created openings do not meet those prescribed in Table 7 the Forest Plan (Page 36), top live green trees to create snags to mimic habitat levels in unmanaged stands. Consider topping groupings of trees, particularly in the Lodgepole Pine and Montane Mixed Conifers habitat types.	shelterwood and mixed harvest units	<i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> (page 59) Altman and Bresson 2017, Bull et al. 1997, USDI 2008
Log Pile Creation Where the risk of bark beetle spread is low, leave up to 10 percent of machine piles unburned, preferably away from roads and in wet / low lying areas. Ideally, retained piles would consist of at least 3-5 layers of larger (9-14 inch) logs crisscrossed, or lain lengthwise in triangular groupings of 3 logs. Cover the top with a few layers (about 2-3 feet) of branches and other small material. The intent would be to create habitat for small mammals.	units that would be machine piled	<i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> (page 59) Gervais 2015

2.2 Wildlife Issues and Topics Addressed in this Analysis

2.2.1 Species Associated with Late Forest Structure (key wildlife issue)

Landres et al. (1999) and Wisdom et al. (2000) maintained that restoring habitats, both the amount and connectivity, to more closely match historical levels provided considerable improvements in the viability outcomes for native wildlife species. Forest Plan Desired Condition *FW-DC-WL-03. Habitat Conditions for*

all Surrogate Species (page 59) is for the amount, distribution, and connectivity of habitat in individual watersheds to be consistent with the historical range of variability.

Closed canopy stands with large trees provide essential habitats for northern goshawks, pileated woodpeckers, and pine marten. Presently, the acreage of these stands in the Sweet Creek Watershed appears to be below historic levels. Thus, we should attempt to maintain all existing habitat in that watershed and promote additional acres of habitat where possible, through stand stocking control. The existing acreage of habitat in the Big Muddy Creek Watershed appears to be within the range of habitat levels that would have existed historically. There is an opportunity to thin certain stands in this watershed to improve stand health and tree growth, while maintaining enough existing habitat to remain within historic levels.

Open canopy stands with large trees (park-like stands) provide essential habitats for white-headed woodpeckers. This habitat is well below historic levels in the Douglas fir-Dry Vegetation Type in both watersheds. There is an opportunity to promote more of this habitat by thinning some dry site stands that presently have more closed canopies and an excess of trees per acre.

2.2.2 Deer and Elk Habitats (wildlife topic)

Forest Plan Guideline *FW-GDL-WL-14. Mule Deer, White-tailed Deer, and Elk Forage* (page 66) is to stimulate the production of browse, and minimize tree invasion into non-forested, brush dominated areas to maintain browse condition on winter ranges. Presently only about 10 percent of winter range in the Sweet-Ione Project Area is providing open foraging habitat. There is an opportunity with this project to create additional acres of open foraging sites and improve browse condition on winter ranges.

Forest Plan Desired Condition *FW-DC-WL-14. Deer and Elk Habitat - Human Activities* (page 60) is to “provide a high level of habitat effectiveness by having less than 30 percent of the winter range within a zone of influence of an open road or motorized travel route. Summer ranges provide a moderate level of habitat effectiveness by having less than 50 percent of the summer range within a zone of influence of an open road or motorized trail.” There is an opportunity to increase habitat effectiveness for big game in the project area through closures of open roads.

2.2.3 Wildlife Resource Indicators and Measures

The following table displays the wildlife resource indicators related to this project and the measures we will use to gauge project effects.

Table 16. Resource indicators and measures for assessing project effects relative to the key wildlife issues.

Resource Element	Resource Indicator	Measure (quantify if possible)	Used to address purpose & need or a key Issue?	Forest Plan direction or supporting publications
late closed focal species	suitable habitat	acres of habitat compared to historic levels in each 6 th field watershed	yes	<i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> , page 59) Research: Wisdom et al. 2000, Landres 1999
late open focal species	suitable habitat	acres of habitat promoted through thinning late closed structural stage stands in the Douglas fir-Dry Vegetation Type	yes	Same as above

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Resource Element	Resource Indicator	Measure (quantify if possible)	Used to address purpose & need or a key Issue?	Forest Plan direction or supporting publications
deer and elk	winter range forage	acres of open foraging sites, acres enhanced by under-burning	no	<i>FW-GDL-WL-14. Mule Deer, White-tailed Deer, and Elk Forage</i> (page 66)
deer and elk	seclusion	Percent of winter and summer ranges within a zone of influence of an open road (0.25 mile).	no	<i>FW-DC-WL-Human Activities</i> (page 60)

2.3 Northern Goshawk (sensitive)

2.3.1 Management Framework

The Forest Plan provides the following direction specific to northern goshawk management.

2.3.1.1 Forest Plan Desired Condition

FW-DC-WL-03. Habitat Conditions for all Surrogate Species, (page 59)

Habitat conditions (amount, distribution, and connectivity of habitat) are consistent with the historical range of variability and contribute to the viability of surrogate and associated species.

2.3.1.2 Forest Plan Standards and Guidelines

FW-STD-WL-01. Nest Sites (page 62)

For forest species listed in Table 14 of the Forest Plan, protect all known active nest sites from human disturbance caused by management activities during the nesting period to reduce the risk of nest abandonment or decline of productivity.

FW-GDL-WL-19. Northern Goshawk Nesting Sites (page 67)

This guideline provides for the protection of suitable reproductive habitat around every known northern goshawk nest that was active within the last 5 years. No adverse management activities should occur within a mapped 30 acre “nest stand” of the most suitable appearing habitat surrounding the nest.

Map a 420-acre “post-fledgling area” (PFA) around each known active goshawk nest stand. PFAs are areas of concentrated use by adult females and fledged juveniles prior to dispersal (Kennedy et al. 1994, Reynolds et al. 1992). PFAs provide foraging opportunities and concealing cover for fledglings. Mapped PFAs should include the nest stand, two other suitable nest stands, and three replacement stands, each approximately 30 acres in size (180 total acres). Forest management may occur within replacement nest stands but canopy closure must exceed 50 percent, post-treatment.

2.3.2 Existing Conditions

Table 17 summarizes the habitat preferences, risk factors, and the projected viability outcome for goshawks on the forest.

Table 17. Habitat parameters for northern goshawks on the Colville National Forest

Habitat Parameter	Description
source habitat	Goshawk habitat consists of complex forest mosaics that provide abundant prey and that include mature to old forest stands for nesting (Reynolds et al. 1992, McGrath et al. 2003). Dry, mesic, and cold-moist vegetation types are all used.

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Habitat Parameter	Description
modeled habitat acres on the CNF	139,340 acres (Youkey 2012)
home range size	approximately 6,000 acres
nest stands	Nests are typically located in mid-closed and late closed structural stage stands that are at least 30 acres in size. Single or multi-storied stands with 50+ percent canopy closure and open stand understories are typically selected. Large trees and high numbers of snags and down logs are desirable (Finn 1994, McGrath et al. 2003). Slopes of less than 40 percent are normally selected.
post-fledging areas (PFAs)	Areas of concentrated use by adult females and juveniles after fledging and prior to dispersal (Kennedy et al. 1994, Reynolds et al. 1992). 420 acres mapped around active nest stands (USDA 2019)
CNF breeding season	March 1 – August 31 (USDA 2019)
prey items	mammals such as squirrels and snowshoe hares, birds such as grouse, woodpeckers, and larger passerine birds
population trend (N. Glaciated Mountains)	decreasing
threats and risk factors	These include: - historic reduction of source habitats, - reduction in numbers of large live trees and snags, - loss of snags (prey habitats) due to forest roads, - fire exclusion in dry forest types which has increased their susceptibility to stand - replacing fires (Gaines et al. 2017).
projected viability outcome on the CNF (see Appendix B)	Outcome B: Suitable environments are broadly distributed and of relatively high abundance, but there are gaps in habitat availability. These gaps are typically not large enough to prevent the species from interacting as a meta-population (Gaines et al. 2017).

Active Nest Stands

We surveyed the Sweet-Ione Project Area for active goshawk nests over the 2018, 2019, and 2020 field seasons based on protocol established by Woodbridge and Hargis (2006). We focused on areas with less than 40 percent slope and stands in mid-closed and late closed structural stages. During these surveys, we located two active goshawk nest stands and one Cooper’s hawk nest stand. We mapped approximately 30 acres of the most suitable appearing habitat around each of the goshawk nests, as designated “nest stands.” We then mapped two adjacent suitable nest stands and three alternate nest stands, each about 30 acres in size (180 acres for each active nest). The Cooper’s hawk nest stand is coincidentally located within a mapped “suitable nest stand” for one of the goshawk pairs.

Private and state lands within the Big Muddy and Sweet Creek Watersheds are almost entirely in early or middle structural stages. Due to their lack of overhead canopy or large trees and other within-stand structures, it is unlikely these lands would be used by goshawks for nesting purposes.

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NFS lands cover approximately 17,043 acres of the Sweet Creek Watershed and approximately 11,629 acres of the Big Muddy Creek Watershed. Based on a 6,000-acre home range size, these lands combined could potentially support five (5) nesting pairs of goshawks. To meet the Forest Plan habitat guideline for five nesting pairs, a total of 900 acres would be managed as nest stands and alternate nest stands on NFS lands in the watersheds (5 nesting pairs x 180 acres / pair = 900 acres).

Potential Nesting Habitat

In addition to the active goshawk nest stands, suitable nest stands, and replacement nest stands described above, we mapped other suitable appearing habitat in the Sweet and Big Muddy Creek Watersheds. We used the forest's Vegetation Type GIS layer, LiDAR imagery of tree heights and canopy closure, and stand exam data to complete this effort. We visited as many polygons in the field as possible to verify their potential suitability for goshawks or other late closed associated species (e.g., pine marten, pileated woodpeckers).

We determined the historical range of late-closed species habitat from vegetation data generated through the Interior Columbia Basin Ecosystem Management Project (Wisdom et al. 2000) which was based on historical photo interpretation. Where photo interpretation was not available, we used the same variables plugged into a State - Transition model that accounts for historic fire regimes and that provides historic habitat values specific to a watershed or landscape. Lastly, we compared the current and historic habitat levels to determine the departure for this habitat from historic conditions, by 6th field watershed (pers. comm. with D. Churchill and B. Gaines 2020).

Table 18 compares the current condition of goshawk reproductive habitat with the historic range of habitat values, by watershed.

Table 18. Comparison of current late-closed associated species habitat to historic conditions in the Sweet-Ione Project Area. All values are approximate.

6th Field Watershed	NFS acres	Historic range of habitat	Existing habitat acres	Management implications
Sweet Creek	16,685	2,280 – 3,874 ac.	1,584	Current habitat is below historic levels. Maintain all mapped stands. Thin younger stands to recruit additional habitat over time.
Big Muddy Creek	11,518	1,288 - 2,256 ac.	1,529	Current habitat is within historic levels. Maintain 1,288 - 1,529 acres of mapped habitat. Thin younger stands to recruit additional habitat over time.

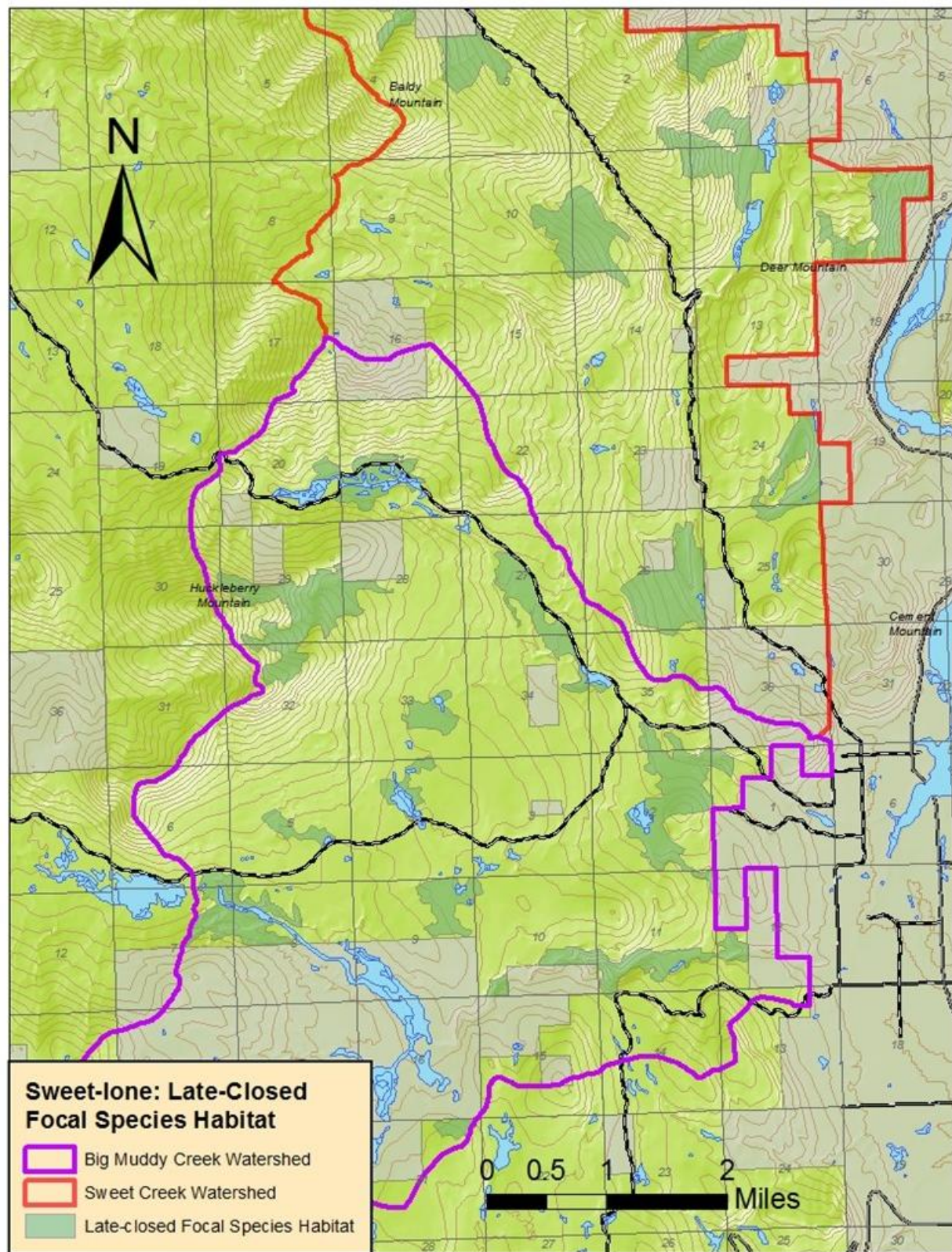


Figure 7. Sweet-Ione Project Area: Late closed associated species habitat. Mapped polygons include stands in mid to late closed structural stages with some biological legacies (e.g., large trees, down logs, log jackpots, etc.).

2.3.3 *Environmental Consequences*

2.3.3.1 *Direct and indirect Effects of No Action*

Large (20+ inch) trees and late closed structural stage stands would be recruited in the project area according to natural processes. It is unlikely that over-stocked, stagnated stands of small diameter trees would ever produce significant numbers of large trees. Large trees growing in over-crowded stands would continue to become less able to fend off insect and disease attack, and drought stress.

Any future wildland fires that burn with lower intensity could improve habitat conditions for goshawks by clearing out dense stand understories and fostering the growth of understory plants that provide food resources (buds, green forage, seeds, berries) for many prey species. However, on-going fire suppression efforts would continue to trend the landscape towards a high-severity fire regime. Young trees would continue to in-fill forest stand understories. Fire-intolerant tree species would continue to colonize areas in which they were historically excluded by fire. Surface fuels would continue to accumulate. Fuel “ladders” from the stand understories into overstory tree crowns would continue to develop. These incremental processes would tend to increase the risk of stand-replacing fires occurring in the area over time. Such fires could remove forest cover over large areas, including existing and potential nesting habitat for goshawks. Effective foraging habitat (forest mosaics with concealing cover) could be reduced on a landscape scale.

2.3.3.2 *Direct and indirect Effects of the Proposed Action*

Timber harvest, pre-commercial thinning, prescribed burning, and mechanical site preparation would all reduce ground fuels and continuous fuel ladders. These treatments would tend to slow the spread of fires that occur in the area and reduce the pathways for fire to ascend into the overstory tree crowns. Thus, the risk of high-intensity fires removing large acreages of suitable goshawk nesting habitat would be reduced.

Proposed forest management activities would be focused on reducing inter-tree competition and restoring historic tree species compositions. This should lead to more vigorously growing trees and increased stand resilience to drought and insect and disease attack.

Known Nesting Habitat - Within the Sweet-Ione Project Area, all mapped goshawk nest stands, suitable nest stands, and alternate nest stands would be reserved from harvest. This would equate to at least 180 acres of habitat left un-harvested around each known active nest. Moser and Garton (2009) found that goshawks re-occupied breeding areas in northern Idaho if more than 39 percent of the post-fledging area (164 acres) surrounding the nest contained potential nesting habitat following harvest. Some portion of approximately 120 acres of suitable and alternate nest stands mapped for the Picket Road nesting goshawk pair could be pre-commercially thinned. Trees up to 7 inches in size would be cut down, with the intention of reducing understory densities and fuel ladders and improving foraging conditions for goshawks.

It is possible a new goshawk nest could be found during future surveys, or by forest workers laying out harvest unit boundaries or marking / cruising trees. In this event, we would map a nest stand and suitable / alternate stands and manage them as directed by the Forest Plan.

Nest Disturbance - We would impose a timing restriction on project activities within 0.25 mile of active nests to ensure that nesting birds and their young are not disturbed, consistent with Forest Plan Standard *FW-STD-WL-01. Nest Sites* (page 62).

Potential Nesting Habitat – Because late closed associated species habitat is below historic levels in the Sweet Creek Watershed, all those stands would be maintained (not harvested). Late closed species habitat is within HRV levels in the Big Muddy Creek Watershed. The Proposed Action would thin approximately 126

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acres of these mapped polygons. The intent of this harvest would be to increase the probability these stands would be maintained over the long term by:

- reducing inter-tree competition for site resources,
- increasing stand resilience to insects, diseases, and drought,
- restoring the historic tree species composition.

A minimum of 50 percent overhead canopy closure would be maintained within the thinned stands. However, the potential for the thinned stands to support nesting by goshawks would be reduced for 15-20 years, until growing tree crowns start to abrade once again. Thinning would concentrate growth on the largest, most vigorous appearing trees. A growing body of research has shown that thinning reduces the inter-tree competition for sunlight, water, and soil nutrients in the harvested stand (OR Dept. of Forestry 2008). Therefore, this harvest prescription can be used to accelerate the development of large diameter trees (Bailey and Tappeiner 1998, Dodson et al. 2012) that are preferred nest sites for large raptors.

Table 19 compares the current condition and Proposed Action in relation to reproductive habitats for goshawks.

Table 19. Comparison of late-closed associated species habitat levels on NFS lands in the Sweet-Ione Project Area. All values are approximate.

6 th Field Watershed	NFS acres	Historic range of late-closed habitat acres	Current habitat acres	Proposed Action habitat acres	Proposed Action habitat acres thinned
Sweet Creek	16,685	2,280 – 3,874	1,588	1,588	0
Big Muddy Creek	11,518	1,288 - 2,256	1,824	1,698	126

Within-stand Structures - Within all proposed harvest units, live trees that are 20+ inches in diameter would be retained (not cut) unless there is a clear silvicultural reason why the removal of smaller trees alone cannot achieve the desired conditions. All snags that are 10+ inches in diameter would be retained in harvest units to the extent feasible. Any trees with old raptor nest platforms would be retained. Up to 12 trees per acre that are 14+ inches in diameter and that have broken-tops, broom rusts, or mistletoe brooms, would be retained. Down logs would be retained consistent with Forest Plan Desired Condition FW-DC-VEG-01. Snags and Coarse Woody Debris (page 36). Thus, the great majority of the existing structures that goshawks typically select for nesting or prey preparation should still be available in the harvested units.

2.3.3.3 Cumulative Effects – Proposed Action

The cumulative effects area is the Big Muddy and Sweet Creek Watersheds. No other timber sales or other projects that could impact goshawk habitat on NFS lands would be active concurrent with the Sweet-Ione project, and none are being planned at this time. See the section of this report titled “Dead Wood Habitats” for a description of potential cumulative effects to this habitat component from personal use firewood gathering. Any potential cumulative effects to goshawks and their essential habitats from other activities / uses on NFS lands (see Appendix A) should be insignificant or discountable.

The forest-wide assessments of species viability (Youkey 2012, Gaines et al. 2017) identified strategies to improve viability outcomes for goshawks across the Okanogan-Wenatchee and Colville National Forests. The following table lists the standard practices and design elements proposed for the Sweet-Ione project that would be consistent with these strategies. Any future timber sales on NFS lands in the watersheds would incorporate similar practices and elements. Timber sales on state and private lands may incorporate some of these practices / design elements but maintaining goshawk viability is unlikely to be a consideration on those ownerships.

Table 20. Sweet-Ione project standard practices and design elements consistent with conservation strategies to improve northern goshawk viability (Youkey 2012, Gaines et al. 2017).

Management issue	Sweet-Ione Proposed Action: Standard Practice / Design Element
reduction in source habitat	Maintain enough existing habitat to be within historic levels in each 6th field watershed. In those watersheds that are currently below historic levels, maintain all existing habitat. Promote additional habitat through commercial thinning and / or under-burning. Reduce forest fuels and restore fire to its historic function across the forest.
declines in the densities of large live trees and snags	Retain large (20+ inch DBH) live trees in harvest units to the extent feasible. Thin stands in middle structural stages to accelerate the development of large trees and increase patch sizes. Retain 10+ inch DBH snags and 14+ inch down logs in harvest units to the extent feasible. Initiate snag recruitment where necessary.
potential loss of snags, down logs due to high road densities	Keep new roads, restricted access roads, and roads brushed out for the project, closed to public use. Close approximately 5 miles of currently open roads.
fire exclusion in dry forest types may have increased susceptibility to stand-replacing fires	Commercially thin forest stands in the Douglas fir Dry Vegetation Type to increase stand resiliency to wildfire, drought, and insect and disease attack. Use prescribed fire to reduce fuel accumulations and reintroduce fire to the landscape on up to 3,040 acres of harvest units and 895 acres outside harvest units (natural fuels units).

2.3.3.4 Effects Determination

If forest management were not initiated in the project area, potential habitats for goshawks would likely be maintained over at least the short-term. Additional large trees and late closed stands would slowly be recruited in the watersheds. The increasing risk of high intensity fires occurring in the area would not be addressed. Such fires could result in the wholesale loss of source habitats at a landscape scale.

With the Proposed Action, timber harvest and fuels reduction treatments would reduce forest fuels and fuel connectivity, decreasing the risk of high-intensity fire behavior.

The Proposed Action would not create gaps in source habitats that would tend to isolate populations of goshawks at the forest-wide scale. At the forest patch scale, the proposed action would maintain enough existing habitat to move the Big Muddy and Sweet Creek Watersheds closer to their historic range of variability for stand structural stages. Scientists with the Interior Columbia Basin Ecosystem Management Project (ICBEMP) assumed that by managing forests to restore HRV conditions in each watershed, adequate habitat for native wildlife species would be provided in the basin because species survived within that range of habitat levels in the past (Wisdom et al. 2000).

At the within-stand scale, the great majority of individual large live trees, snags, and other structures used by these birds would be retained on site. Additional large tree habitat should be promoted over time through commercial thinning.

The Proposed Action would be consistent with all Forest Plan guidance related to active goshawk nests and mapped management areas (nest stands, suitable and alternate nest stands, and PFAs). Based on this

discussion, we expect that the Proposed Action may affect individual goshawks but would not be likely to affect the continued viability of goshawk populations on the forest.

2.4 Other Sensitive Species

2.4.1 Management Framework

The regional forester for the Pacific Northwest Region (R6) maintains a list of sensitive species for each national forest in Washington and Oregon. Sensitive species are those whose population viability is a concern because of:

- significant current or predicted downward trends in numbers of animals, or
- significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Current management direction / recommendations for sensitive species on the CNF can be found in the following documents:

- Colville National Forest Land Management Plan (USDA 2019),
- National Bald Eagle Management Guidelines (USDI 2007),
- Forest Service Manual and Handbooks (FSM/H 2670/2609),
- Migratory Bird Treaty Act of 1918 (MBTA),
- Migratory Birds Executive Order (EO) 12962 of January 10, 2001
- National Environmental Policy Act of 1970 (NEPA),
- National Forest Management Act of 1974 (NFMA),
- species-specific conservation assessments and other documents,
- regional forester policy and management direction.

2.4.2 Existing Conditions

Table 21 displays information relative to the sensitive terrestrial wildlife species presently listed for the CNF. Species in shaded blocks in the table have been documented in the project area, and / or have potential habitat in the area. Sensitive fish and plant species are covered in separate reports.

Table 21. Sensitive wildlife species listed for the CNF as of February 25, 2019 (species in shaded blocks are addressed in this report).

Sensitive species	Status in the project area	Habitat description / other comments
Sensitive Mammals		
bighorn sheep (<i>Ovis canadensis</i>)	No record, outside the range of local populations	On the CNF bighorn sheep occur on Vulcan Mountain in Ferry County and the Hall Mountain / Crowell Ridge area in Pend Oreille County. Source habitat includes Douglas-fir, ponderosa pine, and shrub-steppe cover types with canopy closure <60%. Use areas normally include escape terrain with cliffs, outcrops, talus, and other rock features
gray wolf (<i>Canis lupus</i>)	Documented	Wolves are closely tied to habitats that support abundant big game populations. Limiting human-caused mortality is a primary management concern (Mech 1991). Individuals of the Smackout Wolf Pack have been documented in the Sweet-Ione Project Area (https://wdfw.wa.gov).

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Sensitive species	Status in the project area	Habitat description / other comments
little brown bat (<i>Myotis lucifugus</i>)	Suspected	This bat is found in a wide variety of forest habitats at elevations up to tree line. It usually prefers riparian areas and sites with open water. Roost sites include buildings and bridges, tree cavities, beneath tree bark, rock crevices, caves and mines (Hayes and Wiles 2013). It forages for aquatic insects over water and on a wide variety of insects over forest trails, cliff faces, meadows, and farmland.
North American wolverine	Suspected	Wolverines typically den in higher elevation rockslides, caves, and crevices, often in glacial cirque basins. They forage in all higher elevation forested habitats but particularly those where carrion can be found. They require seclusion from human disturbance (Copeland 1996).
pygmy shrew (<i>Sorex hoyi</i>)	Suspected	This shrew uses a variety of forest types usually near mesic habitats such as wetlands and lake margins. They prefer a substantial litter layer, dense ground vegetation, and woody debris. In Washington, pygmy shrews have been captured in upland, even-aged, second-growth conifer forests (WDFW 2004).
red-tailed chipmunk (<i>Tamias ruficaudus</i>)	Suspected	On the CNF, this species is most prevalent at higher elevations in the moist, Engelmann spruce and subalpine fir plant associations where stand understories are dense (Best 1993). Food resources include conifer seeds, forbs, fruit, and the seeds of shrubs and herbs (Broadbanks in Best 1993).
Sensitive birds		
bald eagle (<i>Haliaeetus leucocephalus</i>)	Documented	Eagles forage on rivers and large lakes with abundant fish. For nesting / perching, they select large trees that stand above the main forest canopy, and usually within one mile of a foraging area. Winter roosts may be in mature stands with good canopy closure (Stalmaster 1987).
common loon (<i>Gavia immer</i>)	No suitable habitat	Loons require large lakes or rivers with abundant fish and adequate shoreline vegetation to conceal a nest. Seclusion from human disturbance is critical to nesting loons (Richardson et al. 2000).
great gray owl (<i>Strix nebulosa</i>)	Suspected	This owl forages in open, grassy habitat including open forest stands, openings created through timber harvest, meadows and wetlands. They nest in forest stands near wet meadows, pastures and other openings. Nest structures include large, broken-topped snags and abandoned raptor nests (Hayward and Verner 1994).
harlequin duck (<i>Histrionicus histrionicus</i>)	No suitable habitat	Harlequins breed on cold, fast-moving mountain streams (ex., Sullivan Creek) with adjacent dense shrub / timber stands and an absence of human disturbance. They winter on boulder strewn coastal waters (Lewis and Kraege 2003). Streams in the project area are too small and / or steep to be used by this species.
Lewis' woodpecker (<i>Melanerpes lewis</i>)	Suspected	This woodpecker is principally associated with open or park-like ponderosa pine stands and cottonwood riparian areas along rivers. They may also nest in burned over stands of Douglas fir, mixed conifers, and riparian woodlands. Brushy undergrowth is an important component of foraging and breeding habitat (Lewis et al. 2002).

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Sensitive species	Status in the project area	Habitat description / other comments
northern goshawk (<i>Accipiter gentilis</i>)	Documented	This wide-ranging forest raptor uses a variety of forest types for nesting and foraging. They tend to select stands with high canopy closure, larger trees, and gentle to moderate slopes, for nesting. Where forest habitats are continuous, the spacing between active nests is fairly regular (Woodbridge and Hargis 2000). Goshawks are ambush hunters known for their agility and relentlessness in pursuit of prey. Prey items include forest grouse, hares, squirrels, woodpeckers, and larger passerine birds.
sandhill crane (<i>Grus canadensis</i>)	No suitable habitat	This species requires isolated, large tracts of marshes or wet meadows that are more than ¼ mile from open roads (Littlefield and Ivey 2002).
white-headed woodpecker (<i>Picoides albolarvatus</i>)	Suspected	Primarily birds of mature, ponderosa pine forests, this species forages on large, decayed snags and ponderosa pine trees greater than 24 inches in diameter (Mellen-McLean 2017). Ponderosa pine occurs in some of the stands in the project area but stands dominated by large trees of this species are rare.
Sensitive butterflies		(James and Nunalee 2011, Foltz-Jordan 2010, Fleckenstein 2006)
eastern tailed blue (<i>Cupido comyntas</i>)	Suspected	This species has adapted well to human activity and thrives in disturbed environments. It uses a variety of lightly wooded, dry habitats and weedy areas. It is found in vacant lots, parks, canals and creeks and fallow fields. Caterpillars feed on both plants in the pea family.
Great Basin fritillary (<i>Speyeria egleis</i>)	Suspected	This species is associated with openings and edges in forest habitats including montane meadows, forest clearings, exposed rocky ridges, and stream banks. Forested habitats themselves are not used.
meadow fritillary (<i>Boloria bellona</i>)	Suspected	Common in the eastern US in hayfields and disturbed habitats. In the west they occur in meadows and openings in aspen or pine forests.
Peck's skipper (<i>Polites peckius</i>)	Documented	In the Pacific Northwest, habitats include mountain meadows, marshy edges of potholes and roadsides. Wet, grassy meadows are preferred.
Tawny-edged skipper (<i>P. themistocles</i>)	Suspected	Habitats includes grasslands and forest openings at mid to low elevations.
Rosner's hairstreak (<i>Callophrys nelsoni rosneri</i>)	Suspected	Habitat for this species includes openings and edges in coniferous forest around western redcedar.
Sensitive bees		(S. Jepson 2014)

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Sensitive species	Status in the project area	Habitat description / other comments
western bumble bee <i>(Bombus occidentalis)</i>	Documented	Bumble bees inhabit a wide variety of natural, agricultural, urban, and rural habitats. Species richness tends to peak in flower-rich meadows of forests and subalpine zones. Western bumblebees were once found throughout Oregon and Washington but are now largely confined to high elevation sites and areas east of the Cascade Crest. Like other bumble bees, this species has three basic habitat requirements: suitable underground nesting sites for the colonies, nectar and pollen from floral resources available throughout the duration of the colony period (spring through fall), and suitable overwintering sites for the queens.
Suckley cuckoo bumblebee <i>(Bombus suckleyi)</i>	Suspected	This cuckoo bumblebee is a nest parasite of other bumble bee species. Meadows and grasslands (particularly at higher elevations) with abundant floral resources are appropriate habitat for this species. This bee is a generalist forager that has been reported to visit a wide variety of flowering plants in Oregon and Washington. "The plant genera most often associated with <i>B. suckleyi</i> observations or collections include: "Aster", <i>Chrysothamnus</i> sp., <i>Cirsium</i> sp., and <i>Solidago</i> sp. (Williams <i>et al.</i> 2014). There are also several records of this species visiting <i>Centaurea repens</i> (Richardson 2017)."
Sensitive dragonflies and damselflies		(Paulson 1999, Foltz 2008, Foltz-Jordan 2010)
subarctic bluet <i>(Coenagrion interrogatum)</i>	No suitable habitat	Populations of this species are localized and rare in the Pacific Northwest. In Washington, it is associated with high-elevation ponds, bogs, fens, and boreal wetlands.
zigzag darner <i>(Aeshna sitchensis)</i>	No suitable habitat	Associated with high-elevation ponds, bogs, fens, and boreal wetlands.
subarctic darner <i>(Aeshna subarctica)</i>	No suitable habitat	Associated with high-elevation ponds, bogs, fens, and boreal wetlands.
delicate emerald <i>(Somatochlora franklini)</i>	No suitable habitat	In Washington, this species has been found only at Bunchgrass Meadows, a Research Natural Area on CNF (Loggers and Moore 2011). Bunchgrass Meadows is an extensive, high elevation, sedge wetland that is similar with boreal bogs located much further north in Canada. It is thought to be a remnant of the last ice age.
Whitehouse's emerald <i>(Somatochlora whitehousei)</i>	No suitable habitat	In Washington, this species has been found only at Bunchgrass Meadows, a Research Natural Area on the CNF (Loggers and Moore 2011).
Sensitive mollusks		
fir pinwheel <i>(Radiodiscus abietum)</i>	Suspected	Most often found in moist and rocky Douglas fir forest at mid-elevations in valleys and ravines and sometimes in western redcedar. It is often found in or near talus of a variety of rock types, or under fallen logs (Duncan 2008)

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Sensitive species	Status in the project area	Habitat description / other comments
magnum mantleslug (<i>Magnipelta mycophaga</i>)	Suspected	This species prefers very moist habitats with permanent or persistent water sources. It is often associated with rock talus, deep leaf and needle duff, and large woody debris. In Washington it is found in subalpine fir plant associations (Frest and Johannes 1995).
thinlip tightcoil (<i>Pristilioma idahoense</i>)	Suspected	This species generally prefers low elevation valleys, ravines, gorges, or talus sites near permanent or persistent water (Frest & Johannes in Foltz-Jordan 2010). In Pend Oreille County, this species has been found in a variety of substrates, including under rotting pieces of wood, among moss-covered litter, and on the underside of poles in an old skid trail (Burke, in Foltz-Jordan 2010).

2.4.3 Environmental Consequences

The following table provides a summary of the effects of the project to sensitive species listed for the Colville National Forest. The expected duration of effects would be as follows: short-term = 0-10 years; mid-term = 10-30 years; long term = 30+ years.

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Table 22. Summary of project effects to sensitive species

Sensitive species	Determination	Rationale for determination
MAMMALS		
gray wolf	<i>No Action</i> may impact individuals or habitat but would not likely cause a trend to federal listing or loss of viability	Across the project area, green forage and browse plants utilized by wolf prey species (big game, small mammals) could become increasingly shaded out by growing conifers over the short to mid-term. Foraging sites could decline in productivity and extent. These effects could be reversed by future fires which remove conifer cover. Increasing fuel loads would incrementally elevate the risk of high-intensity fires occurring in the area. Such fires could remove large swaths of forest cover and create extensive grass / shrub foraging areas. However, the interiors of large, intensively burned areas could lack concealing cover for many years and thus, be under-utilized by wolf prey species (Thomas et al. 1979).
gray wolf	<i>Proposed Action</i> may beneficially impact the species	<p>Seclusion - Any discovered wolf den or rendezvous site would be protected from disturbance, if necessary. Disturbance effects resulting from the Sweet-Ione project would be confined to daylight hours. A small subset of proposed harvest units and new access roads would be active at any given time. While some activities could occur during the winter months, there would be adequate displacement areas for big game animals (wolf prey species) to use, consistent with Forest Plan Guideline <i>FW-GDL-WL-13. Mule Deer, White-tailed Deer, and Elk Habitat – Human Activities</i> (page 66).</p> <p>New roads, existing restricted access roads, and roads brushed out for the project would be kept closed to public use. Closures of existing open roads would occur with this project. The resultant reduction in open road density would tend to improve habitat effectiveness for both wolves and their prey, consistent with Forest Plan Desired Condition <i>FW-DC-WL-14. Deer and Elk Habitat – Human Activities</i> (page 60).</p> <p>Prey Habitat - Timber harvest and fuels treatments would reduce conifer cover, improving growing conditions for sun-loving big game forage plants over the short to mid-term, consistent with Forest Plan Guideline <i>FW-GDL-WL-14. Mule Deer, White-tailed Deer and Elk Forage</i> (page 66). The project would move the landscape closer to its historic range of variability for stand structural stages per Forest Plan Desired Condition <i>FW-DC-WL-13. Deer and Elk Habitat – Summer and Winter Range Cover and Forage</i> (page 60).</p> <p>Cumulative Effects – No other timber sales would be active concurrent with the Sweet-Ione project, or are presently planned on NFS lands in the Big Muddy and Sweet Creek Watersheds. Disturbance effects from the Sweet-Ione Project could be cumulative to those attributed to any coincident forest management projects on other ownerships in the watersheds, as well as to some of the ongoing activities identified in Appendix A. However, disturbance from the Sweet-Ione Project would be limited in time and space and mitigated with the project design elements related to closed road management, described above.</p> <p>See the section of this report titled “Deer and Elk (species of management interest)” for a discussion of cumulative effects to these wolf prey species.</p>

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Sensitive species	Determination	Rationale for determination
little brown bat	<p><i>No Action</i></p> <p>may impact individuals or habitat but would not likely to cause a trend to federal listing or loss of viability</p>	<p>No known suitable mines or abandoned buildings in the project area that could provide roost or maternity sites.</p> <p>Forest habitats likely maintained over at least the short term. Increasing fuel loads would continue to elevate the risk of stand-replacing fires. Where future wildfires burn hot, existing snags and defective live trees that may be providing roost sites could be lost. A “pulse” of new snags would be created. In a few years, bats could find new roost sites under the sloughing bark of the larger snags. After 2-3 decades, most of the fire-killed trees would have fallen to the ground. There would then be a decades-long period of low snag availability as the burn scar slowly becomes reforested. Where vegetation is burned at a lower intensity, impacts to forest cover and existing roost trees would be less severe. Wildfires could promote diverse, robust stand understories important to many insect prey species.</p>
little brown bat	<p><i>Proposed Action</i></p> <p>may beneficially impact the species</p>	<p>Forest thinning and fuels reduction work would reduce the potential for large scale forest habitat loss to stand-replacing fires.</p> <p>Roost Trees - The project could remove some dead or defective live trees that may be providing roost habitat, particularly within new road or equipment corridors. Large snags would be retained in harvest units per Forest Plan Standard <i>FW-STD-WL-12. Large Snag Habitat</i> (page 64). Up to 12 trees per acre that are hollow, or that have woodpecker cavities would be retained in harvest units. Almost 5 miles of open roads would be closed, locally reducing the loss of standing dead trees to firewood cutting. Also see the “Dead Wood Habitats,” section of this report.</p> <p>Foraging Habitat - Commercial thinning would reduce forest “clutter” and increase within-stand flight space (Humes et al. 1999). This should improve bat mobility and foraging access. Understory vegetation in harvested and under-burned stands should become more robust over the short term, potentially benefitting insect prey species. Forest edge habitats that bats frequently use for foraging would be promoted with shelterwood and group selection harvest. Riparian vegetation around wetlands and stream courses would be conserved.</p> <p>Cumulative Effects - No other known timber sales would be concurrently active with the Sweet-Ione project, or are planned on NFS lands within the affected watersheds. Effects to snag habitat from the Sweet-Ione Project could be cumulative to firewood cutting in the area. However, given our standard practices related to snags and the proposed road closures, we expect the long-term benefits of the proposed action would mitigate these potential effects.</p>
red-tailed chipmunk	<p><i>No Action</i></p> <p>may impact individuals or habitat but would not likely cause a trend to federal listing or loss of viability</p>	<p>Higher elevation source habitats likely maintained in the project area over at least the short term.</p> <p>Increasing fuel loads would continue to elevate the risk of stand-replacing fires. Such fires could kill individual animals and result in large-scale reductions in source habitats for the species. Mature, cone-bearing trees could be lost. The availability of seeds and berry crops could be reduced. Where future wildfires burn with lower intensity, understory cover should quickly re-establish. The growth of sun-loving forage plants could be enhanced within burn scars over time.</p>

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Sensitive species	Determination	Rationale for determination
red-tailed chipmunk	<p><i>Proposed Action</i></p> <p>may impact individuals or habitat but would not likely cause a trend to federal listing or loss of viability</p>	<p>Forest thinning and fuels treatments would reduce the potential for fire spread into source habitats. Overhead canopy closure and crown bulk density would be reduced to varying extents in harvest units depending on the harvest prescription. Individual animals could be killed by heavy equipment operation and prescribed fires. Animals could be more susceptible to predation in treated areas, owing to a reduction in low cover.</p> <p>Large Trees - Timber harvest and fuels reduction treatments would reduce forest fuels and fuel connectivity, decreasing the risk of wildfire spread into mature overstory tree crowns. Large, full-crowned trees which produce the biggest cone crops would be retained in harvest units consistent with Forest Plan Guideline <i>FW-GDL-VEG-03. Large Tree Management</i> (pages 41-42). The Proposed Action would be designed to conserve existing late closed forest stands and promote additional stands per Forest Plan Desired Condition <i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> (page 59). Landres et al. (1999) and Wisdom et al. (2000) maintained that restoring habitats, both the amount and connectivity, to closer match the historical range of variability, provided considerable improvements in the viability outcomes for native wildlife species. The project would set the stage for the accelerated development of additional large trees and late structural stage stands, through stand stocking control (Bailey and Tappeiner 1998, Dodson et al. 2012).</p> <p>Forage Resources - Timber harvest and fuels treatments would stimulate the growth of diverse understories of grasses, forbs and shrubs. Edge habitat would be created through shelterwood and group selection harvest. Thus, the project could enhance forage resources for this species over the short to mid-term.</p> <p>Cumulative Effects – No other vegetation management projects would be concurrently active or are planned on NFS lands in the watersheds. Summer recreation and other forest uses (see Appendix A) could cumulatively impact food plants and low cover in local areas. However, we expect the potential benefits of the project to stand understories / food resources would mitigate any potential adverse effects.</p>
pygmy shrew	<p><i>No Action</i></p> <p>may impact individuals or habitat but would not likely cause a trend to federal listing or loss of viability</p>	<p>Forest openings and edge habitats would decline in the project area over the short to mid-term through natural forest succession. Future fires could reverse this trend. Increasing fuel loads would continue to elevate the risk of large-scale, intense fires that could kill individual pygmy shrews, and remove food resources and low cover. Where future wildfires do not impair soil productivity, they could promote diverse and robust stand understories over the short to mid-term. The growth of sun-loving forage plants could be enhanced in new burn scars.</p>

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Sensitive species	Determination	Rationale for determination
pygmy shrew	<p><i>Proposed Action</i></p> <p>may impact individuals or habitat but would not likely cause a trend to federal listing or loss of viability</p>	<p>Pygmy shrews could be directly killed by heavy equipment operation and prescribed fires. Animals could also be more susceptible to predation in treated areas, due to the reduction in ground level cover.</p> <p>Understory Cover - Understory plants could be crushed by heavy equipment operation and removed by prescribed fires. However, within a few growing seasons the herb and shrub layers should resemble pre-treatment conditions in most areas. Plant density and vigor should be enhanced over time due to the increased availability of sunlight, water, and soil nutrients in treatment areas. Down logs would be retained in harvest units consistent with <i>Forest Plan Desired Condition FW-DC-VEG-04. Snags and Coarse Woody Debris</i> (pages 36-37). Hardwoods would be retained in harvest units and should benefit from the reduction in competition with conifers. Hardwood trees contribute leaf litter to the forest floor.</p> <p>Mesic Habitats - The project would conserve or improve riparian habitats consistent with Forest Plan Desired Condition <i>FW-DC-WR-03. Self-Sustaining Native and Aquatic and Riparian Dependent Species</i> (page 51). Specifically, the project would:</p> <ul style="list-style-type: none"> - conserve riparian vegetation, - maintain an average 60 percent tree canopy closure in RMAs, - permanently remove selected roads from RMAs, - complete aquatic restoration projects to restore stream connectivity, improve in-stream habitat complexity, and raise water tables. <p>Cumulative Effects - No other timber sales or fuels treatment projects would be concurrently active with the Sweet-Ione project, and none are planned on NFS lands in the watersheds. The forest has an ongoing program of invasive weed control. Any herbicide applications in the project area would be targeted, limited in extent, and intended to replace noxious weeds with desirable native plants per Forest Plan Desired Condition <i>FW-DC-IS-01. Integrated Management for Invasive Species</i> (page 68). Livestock grazing and summer recreation in the project area could cumulatively impact low cover (see Appendix A). However, the project design elements described above, and the expected improvements in understory plant density / productivity should mitigate for any potential adverse effects.</p>
wolverine	<p><i>No Action</i></p> <p>may impact individuals or habitat but would not likely cause a trend to federal listing or loss of species viability</p>	<p>No known active or historic wolverine dens on the forest. No apparently suitable den habitat in the Sweet-Ione Project Area.</p> <p>Baseline habitat conditions likely maintained over at least the short term. Increasing fuel loads would continue to elevate the risk of large-scale forest cover loss to future, high-intensity fires. Wildfires could promote forage production / palatability for wolverine prey species. Wildfires could promote berry production over the short to mid-term. The interiors of large burns could lack concealing cover over at least the short-term and are likely to be under-utilized by wolverines and many prey species.</p>

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Sensitive species	Determination	Rationale for determination
wolverine	<i>Proposed Action</i> may impact individuals or habitat but would not likely cause a trend to federal listing or loss of species viability	Forest thinning and fuels reduction treatments should reduce the risk of future high-intensity fires in the higher elevation portions of the project area. No change in open road miles or designated snowmobile routes in the higher elevation portions of the project area. Cumulative effects – Any potential cumulative effects to this wide-ranging forest carnivore would be analogous to those detailed in the section on grizzly bears in the biological evaluation for this project.
BIRDS		
bald eagle	<i>No Action</i> may impact individuals or habitat but would not likely cause a trend to federal listing or loss of viability	No known bald eagle nests or winter roosts in the project area. High quality nesting, foraging, and perching habitat is located east of the project area along the Pend Oreille River. Existing large trees would likely be maintained in the project area over at least the short term. Increasing forest fuels would continue to elevate the risk of high-intensity crown fires occurring in the area. Such fires could remove large trees that provide potential nest, perch and roost trees. Suitable habitat along the Pend Oreille River is unlikely to be affected by fires occurring in the project area, owing to intervening fuel breaks such as residential areas, fields, pastures, and State Highway 31

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Sensitive species	Determination	Rationale for determination
bald eagle	<i>Proposed Action</i> beneficial impact	<p>Disturbance - Active nests on the Pend Oreille River are too far removed to be disturbed by the Sweet-Ione project. If a new nest is discovered in the project area, it would be protected from human disturbance consistent with Forest Plan Standard <i>FW-STD-WL-01. Nest Sites</i> (page 62).</p> <p>Large Tree Habitats – Forest thinning and fuels reduction work would reduce the potential for stand-replacing fires to remove large trees.</p> <p>Large trees would be retained in harvest units consistent with Forest Plan Guideline <i>FW-GDL-VEG-03. Large Tree Management</i> (page 41). Large trees would be promoted over the long term through commercial thinning of mid-structural stage stands (Bailey and Tappeiner 1998, Dodson et al. 2012). Large snags that could be used as perch trees would be retained in harvest units consistent with Forest Plan Standard <i>FW-STD-WL-12. Large Snag Habitat</i> (page 64). Any newly discovered bald eagle nests or winter roosts would be managed for their continued suitability per Forest Plan Desired Condition <i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> (page 59).</p> <p>Cumulative Effects – No timber sales or fuels treatment projects would be active concurrent with the Sweet-Ione project, or are planned on NFS lands in the watersheds. Any potential cumulative effects to bald eagles or large tree habitats from other projects, activities, or uses on NFS lands (see Appendix A) should be insignificant or discountable.</p> <p>Large trees would be conserved on state and private lands according to WA State Forest Practices regulations. Generally, where forest management occurs on those ownerships, large trees would be retained to a much lesser degree than on NFS lands. Large cottonwoods and other trees in the Pend Oreille River corridor are likely to continue to be lost to residential development over time.</p>
great gray owl	<i>No Action</i> may impact individuals or habitat but would not likely to cause a trend to federal listing or loss of species viability	<p>Nesting by great gray owls has not been documented on the forest to date.</p> <p>Potential reproductive habitat and foraging conditions likely maintained over at least the short term. Where future fires burn with low to mixed severity, forest mosaics that include openings, edge habitat, and robust understory vegetation could be created. These habitats are preferred by many prey species including voles and other rodents. However, with the continued build-up of forest fuels, there would be an increasing risk of high-intensity fires occurring in the area over time. Such fires could remove nest structures and entire nesting stands.</p>

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Sensitive species	Determination	Rationale for determination
great gray owl	<p><i>Proposed Action</i></p> <p>may impact individuals or habitat but would not likely to cause a trend to federal listing or loss of species viability</p>	<p>Project-related Disturbance - If an active nest was discovered in the project area, we would ensure it is protected from disturbance consistent with Forest Plan Standard <i>FW-GDL-WL-18. Nest Sites</i>, (page 67).</p> <p>Nest Structures - Larger snags would be retained to the extent feasible in harvest units per Forest Plan Standard <i>FW-STD-WL-12. Large Snag Habitat</i> (page 64). Up to 12 potential nest trees / per acre would be retained in harvest units including trees with broken tops, trees with old raptor nests, and trees infected with rusts or mistletoes. This standard practice is consistent with Forest Plan Desired Condition <i>FW-DC-VEG-05. Biological Legacies</i> (page 37).</p> <p>Nest Stands – The project would be designed to conserve existing late closed forest structure and promote additional stands per Forest Plan Desired Condition <i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> (page 59). Any newly discovered nest stand would be managed for its continued suitability per Forest Plan Desired Condition <i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> (page 59).</p> <p>Foraging Habitats - Forest openings would be created within areas proposed for shelterwood and group selection harvest. As the understory plants respond to the increased sunlight in these openings, they would begin to provide the low cover and foraging conditions favored by many small mammal prey species over the short term. Prescribed burning proposed with this project would also tend to promote robust stand understories. Riparian habitats would be buffered to protect vegetation and hydrologic function. These mesic habitats are important to red-backed voles and other prey animals.</p> <p>Cumulative Effects – No other timber sales or fuels treatment projects would be active concurrent with the Sweet-Ione project, or are planned on NFS lands in the watersheds. See the section of this report titled “Dead Wood Habitats” for a discussion of cumulative effects to this habitat component. Any other recent or on-going projects, activities, or uses on NFS lands (see Appendix A) should have insignificant or discountable effects to great gray owls and their essential habitats.</p> <p>Large trees would be conserved on state and private lands according to WA State Forest Practices regulations. Generally, where forest management occurs on those ownerships, large trees and late closed forest structure would be conserved to a much lesser degree than on NFS lands. Additional forest openings are likely to be created on state and private lands over time.</p>
Lewis’ &, white-headed woodpecker	<p><i>No Action</i></p> <p>may impact individuals or habitat but not likely to cause a trend to federal listing...</p>	<p>Dry forest stands and large ponderosa pine trees would likely be maintained over at least the short term. Where future fires burn with lower intensity, there could be beneficial effects to source habitats from a reduction in stand density and fuel ladders. Increasing fuel loads would continue to elevate the risk of high-intensity fires occurring in the area. Such fires could remove source habitats at a landscape scale. Areas of fire-killed trees could be exploited by Lewis’ woodpeckers.</p>

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Sensitive species	Determination	Rationale for determination
Lewis' & white-headed woodpecker	<i>Proposed Action</i> beneficial impact	<p>Source Habitats - Forest thinning and fuels reduction work would reduce the potential for fire spread into source habitats. Existing dry site, late closed structural stage stands would be converted to a late open condition. This habitat is well below levels that existed historically in the watersheds and is preferred by the two woodpeckers. Commercial thinning in mid-closed, dry site stands would set the stage for the accelerated development of open, park-like stands over time, consistent with Forest Plan Desired Condition: <i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> (page 59). Large live trees (20+ inches) would be retained in harvest units per Forest Plan Guideline: <i>FW-GDL-VEG-03. Large Tree Management</i> (page 41).</p> <p>Dead Wood - Large (20+ inch) snags would be retained in harvest units per Forest Plan Standard: <i>FW-STD-WL-12. Large Snag Habitat</i> (page 64). Prescribed burning should result in a small net gain of snags (pers. comm. with E. Trimble 2009). Proposed road closures would locally reduce the loss of standing dead trees to firewood cutting. Also see the section "Dead Wood Habitats," later in this report.</p> <p>Cumulative Effects - No other timber sales or fuels treatment projects would be active concurrent with the Sweet-Ione project, and none are planned on NFS lands in the watersheds. See the section of this report titled "Dead Wood Habitats" for a discussion of cumulative effects to this habitat component. Other recent or on-going activities identified in Appendix A should have insignificant or discountable effects to dry site stands on NFS lands.</p> <p>Where forest management occurs in dry site stands on state and private lands, large trees would likely be retained to a much lesser degree than on NFS lands.</p>
northern goshawk	<i>No Action</i> may impact individuals or habitat but would not likely to cause a trend to federal listing or loss of viability	<p>Existing and potential nesting habitats for goshawks likely maintained over at least the short-term. Additional large trees and late closed stands would be slowly recruited in the watersheds. Goshawks would continue to have limited access / mobility within dense, mid-closed stands. These stands would continue to have limited habitat value for most goshawk prey species. Forest succession would convert created openings to middle structural stages over the short to mid-term, potentially reducing habitat diversity and foraging opportunities.</p> <p>Future wildland fires that burn with lower intensity could create more vegetative diversity and edge habitats, potentially benefitting prey species in the project area. However, on-going suppression of all fires would continue to increase the risk of large-scale, stand-replacing fires over time. Such fires could remove large swaths of mid-closed and late closed source habitats, large live trees, and other structures used by the species.</p>

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Sensitive species	Determination	Rationale for determination
northern goshawk	<p><i>Proposed Action</i></p> <p>may impact individuals or habitat but would not likely to cause a trend to federal listing or loss of viability</p>	<p>Proposed forest management would reduce the risk of source habitat loss to stand-replacing fires.</p> <p>Project-related Disturbance – Known active nests and any newly discovered nests would be protected from project disturbances per Forest Plan Standard <i>FW-STD-WL-01. Nest Sites</i>, (page 62).</p> <p>Nest Stands – All mapped active nest stands, suitable nest stands, and replacement nest stands would be reserved from harvest. Thus, the project would be consistent with Forest Plan Guideline <i>GDL-WL-19. Northern Goshawk Nesting Sites</i> (page 67).</p> <p>All mapped late-closed species habitat would be maintained (not harvested) in the Sweet Creek Watershed, as this watershed is below the historic range of variability (HRV) for this habitat. Enough habitat would be maintained within the Big Muddy Creek Watershed for this watershed to remain within HRV. Forest thinning and fuels reduction work should accelerate the development of additional suitable nesting habitat over the long term.</p> <p>Within-Stand Structures - Large trees would be retained in harvest units consistent with Forest Plan Guideline <i>FW-GDL-VEG-03. Large Tree Management</i> (page 41). Large trees would be promoted over the long term through commercial thinning of mid-structural stage stands (Bailey and Tappeiner 1998, Dodson et al. 2012). Other structures used by goshawks and prey species include snags, down logs, hardwood trees, and “biological legacy trees”. These structures would be retained in harvest units consistent with Forest Plan direction: <i>FW-STD-WL-12. Large Snag Habitat</i> (page 64), <i>FW-DC-VEG-04. Snags and Coarse Woody Debris</i> (pages 41-42), <i>FW-GDL-WL-03. Unique Habitats</i> (page 64), and <i>FW-DC-VEG-05. Biological Legacies</i> (page 37).</p> <p>Foraging Habitats - Timber harvest would reduce concealing cover, especially where forest openings are created. This could reduce foraging effectiveness for goshawks and make birds more susceptible to mobbing and predation.</p> <p>Within openings created by timber harvest, understory plants would become more productive and robust over a few growing seasons, especially where units are under-burned to reduce logging slash. These early stand conditions are favored by many avian and mammal prey species. Goshawks could exploit these prey resources, especially along created forest edges. Commercial thinning and prescribed burning outside of harvest units would reduce stand understories that might have obstructed flight corridors used by goshawks to hunt prey.</p> <p>Cumulative Effects - No other timber sales or fuels treatment projects would be active concurrent with the Sweet-Ione project, or are planned on NFS lands in the Big Muddy and Sweet Creek Watersheds. See the section of this report titled “Dead Wood Habitats” for a discussion of cumulative effects to this habitat component. Any potential cumulative effects to this species resulting from recent or on-going projects, uses, or activities on NFS lands (see Appendix A) should be insignificant or discountable.</p> <p>Past forest management on private and state lands appears to have greatly reduced the potential for those lands to support nesting goshawks over at least the short to mid-term.</p>

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Sensitive species	Determination	Rationale for determination
Invertebrates		
butterflies, dragonflies, damselflies, bees, mollusks	<i>No Action</i> may impact individuals or habitat but would not likely cause a trend to federal listing or loss of viability	Forest openings and edge habitats are utilized by many sensitive invertebrates. These habitats are likely to be reduced in quality or lost altogether over the short to mid-term, due to natural forest succession. Future fires that burn with lower severity are likely to promote diverse and robust stand understories over the short to mid-term. The growth of sun-loving forage plants utilized by many sensitive invertebrates could be enhanced in new burn scars. Flower production would likely increase on these sites. However, on-going suppression of all fires would continue to increase the risk of large scale, stand-replacing events in the area. Such fires could kill local invertebrate populations and remove food resources and low cover on a landscape scale.

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Sensitive species	Determination	Rationale for determination
butterflies, dragonflies, damselflies, bees, mollusks	<i>Proposed Action</i> may impact individuals or habitat but would not likely cause a trend to federal listing or loss of viability	<p>Less mobile animals could be directly killed by heavy equipment operation and prescribed fires. Some species could be more susceptible to predation in areas where concealing cover has been reduced. Vegetation reduction / removal could dry out mesic, forest floor habitats. Food plants could be crushed by heavy equipment operation and removed by prescribed fire.</p> <p>Understory Plants - Shelterwood and group selection harvest would create forest openings and associated edge habitats that are exploited by many sensitive invertebrate species. Although timber harvest and prescribed burning would reduce understory plant biomass, after a few growing seasons the herb and shrub layers should resemble pre-treatment conditions. Understory plant density and vigor should be enhanced over time due to the increased availability of sunlight, water, and soil nutrients in the treated areas. Where they exist, flowering plants required by bees and other invertebrates should increase.</p> <p>Special Habitats - Special habitats important to some species would be conserved consistent with Forest Plan Guideline <i>FW-GDL-WL-03. Unique Habitats</i> (page 64). Project activities would avoid meadows and rock talus habitats. Down logs would be retained in harvest units consistent with Forest Plan Desired Condition <i>FW-DC-VEG-04. Snags and Coarse Woody Debris</i> (page 36-37).</p> <p>Riparian Habitats - The project would conserve or improve riparian habitats consistent with Forest Plan Desired Condition <i>FW-DC-WR-03. Self-Sustaining Native and Aquatic and Riparian Dependent Species</i> (page 51). Specifically, the project would:</p> <ul style="list-style-type: none"> • conserve riparian vegetation, • maintain an average 60 percent tree canopy closure in the moist vegetation types, in Riparian Management Areas (RMAs), • permanently remove selected roads from RMAs, • complete aquatic restoration projects to restore stream connectivity, improve in-stream habitat complexity, and raise water tables. <p>Cumulative Effects - No other timber sales or fuels treatment projects would be concurrently active with the Sweet-Ione project, or are planned on NFS lands in the Big Muddy and Sweet Creek Watersheds. The forest has an ongoing program of treating invasive weeds, including those that are utilized by bees and other invertebrates. Any herbicide applications in the project area would be targeted, limited in extent, and intended to replace noxious weeds with desirable native plants per Forest Plan Desired Condition <i>FW-DC-IS-01. Integrated Management for Invasive Species</i> (page 68). Livestock grazing and summer recreation in the project area (see Appendix A) could also cumulatively impact food plants and low cover for sensitive invertebrates. However, these potential cumulative effects should be amply mitigated with the promotion of grasses, herbs, and flowering plants where they exist in areas of proposed timber harvest and fuels treatments. We would not expect the Sweet-Ione project to cause livestock to have improved access to riparian habitats, due to the project design elements specific to this habitat described above.</p>

2.5 Surrogate Species and Landbirds

2.5.1 Management Framework

Forest Plan Appendix C lists the “surrogate” wildlife species that were selected to represent specific habitats and risk factors across the forest. The viability of surrogate species should be enhanced by providing the appropriate mix of stand structural stages by vegetation type, and by reducing risk factors. Descriptions of the potential “viability outcomes” for surrogate species on the forest (Gaines et al. 2017) are provided in Appendix B of this report.

The Forest Service is charged with the conservation and protection of migratory birds under the Migratory Bird Treaty Act of 1918, Executive Order (EO) 13186 (66 Fed. Reg. 3853, January 17, 2001), and the Memorandum of Understanding (MOU) developed between the agency and the USDI Fish and Wildlife Service. Several surrogate species listed for the forest are coincidentally identified as “landbird focal species for conservation” in the Northern Rocky Mountains of Oregon and Washington (Altman and Bresson 2017).

2.5.1.1 *Forest Plan Desired Conditions*

FW-DC-WR-02. Hydrologic and Aquatic and Riparian Habitat Connectivity (page 50).

Riparian Management Areas (RMAs) provide intact habitat refugia and unobstructed routes to areas critical for fulfilling life history requirements of aquatic, riparian dependent, and terrestrial plants, and animals

FW-DC-WL-03. Habitat Conditions for all Surrogate Species (page 59).

Habitat conditions (amount, distribution, and connectivity of habitat) are consistent with the historical range of variability and contribute to the viability of surrogate species and associated species

FW-DC-WL-10. Risk Factors for all Surrogate Species (page 60).

Reduce the potential detrimental effects of roads, uncharacteristic wildfire, unregulated livestock use, introduced species, invasive species, and disturbance during critical time periods in order to contribute to the viability of surrogate species and associated species

2.5.1.2 *Forest Plan Standards and Guidelines*

Species-specific management direction for surrogate species and landbirds is identified in other sections of this report (e.g., Sensitive Species, Dead Wood Habitats).

2.5.2 Existing Conditions

Table 23 displays information relative to the surrogate species presently listed for the CNF. Species in shaded blocks in the table have been documented in the Sweet-Ione Project Area, and / or have potential habitat in the area.

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Table 23. Surrogate species listed for the Colville National Forest (USDA 2019). This table does not include sensitive species covered earlier in this report or threatened or endangered species covered in the biological evaluation for this project (Borysewicz 2020). Species in shaded blocks are addressed in this report.

Surrogate species	Status in project area	Habitat family / group and description and species viability rating (Gaines et. al. 2017)	Threats / Management considerations (Gaines et. al. 2017)
American marten <i>(Martes americana)</i>	Documented	Medium / large trees: cold-moist forest group Martens prefer higher elevation, mature, cold-moist forest (subalpine fir vegetation types) with old growth components such as large snags and logs and closed-canopies. Riparian areas are preferred. <i>Historic viability: A Current viability: B-C</i>	1. Old forest habitat has been reduced and fragmented from historic conditions. 2. High road densities can facilitate trapping / poaching, and a reduction in snags. 3. There is a risk of fire spread from dry forest to adjacent source habitat (Townsend et. al. 2004).
Bighorn sheep <i>(Ovis canadensis)</i>	Outside known range / no suitable habitat	Woodland / grass / shrub: Grass/ shrub group On the CNF bighorn sheep occur on Vulcan Mtn. and Hall Mtn. Source habitat includes Douglas fir, ponderosa pine, and shrub-steppe cover types with canopy closure < 60%. Occupied habitat normally includes escape terrain (cliffs, outcrops, talus, and other rock features). <i>Historic viability: A Current viability: C-D</i>	1. Fire exclusion can lead to denser stands and reduced forage quality. 2. Domestic sheep can spread disease to bighorn populations. 3. Human disturbance can reduce habitat effectiveness.
black-backed woodpecker <i>(Picoides arcticus)</i>	Documented	Open forest: Post-fire habitat group This species is closely associated with recently burned (< 5 years) areas with high densities of dead and defective live trees. Secondary habitat is stands of trees > 10 inches in diameter and with > 50 percent canopy closure. Also found in areas of insect outbreak in the past 10 years. <i>Historic Viability: A Current viability: primarily C</i>	This species may be limited by: 1. low abundance of trees recently killed by fires, 2. decline in secondary habitat, 3. low snag densities in secondary habitat.

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Surrogate species	Status in project area	Habitat family / group and description and species viability rating (Gaines et. al. 2017)	Threats / Management considerations (Gaines et. al. 2017)
Cassin's finch (<i>Haemorhous cassinii</i>)	Suspected	Medium / large trees: All forest group This bird breeds in open, mature forests of lodgepole and ponderosa pine, aspen, subalpine fir, grand-fir and juniper woodlands. It is positively influenced by thinning and burning restoration treatments in dry forests that retain large trees but reduce canopy cover. More abundant in salvage-logged stands where dead and down lodgepole pine was removed. <i>Historic viability: A Current viability: D</i>	1. Stands of larger diameter trees and open canopy forests have declined from historic conditions. 2. Livestock grazing (Saab et. al. 1995)
Columbia spotted frog (<i>Rana luteiventris</i>)	Documented	Riparian: Ponds / small lake / backwater group Breeding habitat is in small ponds with silt or muck bottoms and emergent vegetation. Wintering habitat is ponds and lakes that are at least 5 acres in size and 10 feet deep. <i>Historic viability: A Current viability: C</i>	1. Wetlands may be degraded by adjacent road construction or vegetation treatments. 2. Introduced predators (trout and bullfrogs) can reduce native amphibian populations. 3. Trailing and grazing by livestock could remove riparian cover and degrade water quality.
eared grebe (<i>Podiceps nigricollis</i>)	no suitable habitat	Wetland: Marsh / open water group Preferred habitats include large wetlands, ponds, and lakes that are 75+ acres in size, 70+ percent open water, 9.8+ feet deep and below 5,900 feet in elevation. <i>Historic viability: C-D Current Viability: E</i>	1. Wetlands may be degraded by adjacent road construction or vegetation treatments. 2. Invasive species (specifically carp) can remove vegetation and degrade water quality. 3. Water-based recreation can destroy nests or cause nest abandonment.
fox sparrow (<i>Passerella iliaca</i>)	Suspected	Open forest: Early successional group Strongly associated with riparian shrubs (ex. willow, alder) and the shrub stage (3 to 15 years of growth) of succession following fire and clearcut logging in mature forests. Single and multi-story forest stands in mesic forest, cold-dry, cold-moist, and parkland vegetation with < 30% canopy cover. <i>Historically viability: A Current viability: E</i>	1. Early seral habitats, including those resulting from fire (Simon et. al. 2002) have often been reduced from historic conditions. 2. Livestock browsing on riparian shrubs may impact shrub density and recruitment.

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Surrogate species	Status in project area	Habitat family / group and description and species viability rating (Gaines et. al. 2017)	Threats / Management considerations (Gaines et. al. 2017)
fringed myotis (<i>Myotis thysanodes</i>)	Suspected	Open forest: All forest group Common in dry woodlands (ponderosa pine) but found in a wide variety of habitats. Roosts in crevices in buildings, mines, rocks, cliff faces, and bridges. Roosting in large decadent trees and large snags is common. <i>No viability assessment due to lack of knowledge to adequately map habitat and develop a model at this scale.</i>	1. Use bat-friendly gates or seasonal closures to protect hibernacula and summer roosts from human disturbance. 2. Maintain large diameter hollow trees and large, tall, recently dead snags.
golden eagle (<i>Aquila chrysaetos</i>)	Suspected	Woodland / grass / shrub family and group Habitat requirements include sources of food, nesting sites, and limited human intrusion. Birds typically nest in cliffs 50+ feet high and below 3,500 feet in elevation. Foraging areas include open grassland, sagebrush, and other native shrub communities. They avoid foraging in agricultural land and burned areas. <i>Historic viability: A Current viability: B</i>	1. Early seral and grassland habitats have often been reduced from historic conditions. 2. Livestock grazing may impact low cover and forage for small mammal prey species. 3. Disturbance associated with roads and human uses can degrade nest habitat effectiveness. 4. Sustainability of dry forests as nesting source (Townsend et. al. 2004)
lark sparrow (<i>Chondestes grammacus</i>)	no suitable habitat	Woodland / grass / shrub family and group Found in dry, open grasslands, shrub-steppe, and mixed-grass and shortgrass uplands with a shrub component and sparse litter. Prefer structurally open herbaceous ground cover containing scattered trees or shrubs with < 24% canopy cover. <i>Historic viability: A Current viability: C-D</i>	1. Grasslands and open forest stands have often been reduced from historic conditions. 2. Agricultural practices may promote nest parasitism by cowbirds.
MacGillivray's warbler (<i>Oporornis tolmiei</i>)	Common on the CNF	Riparian: Shrubby, deciduous riparian group Prefers canyons and draws, dense willows along streams, second-growth woodland habitat that can be created by fire or logging, including dead or fallen trees, brushy areas near low moist ground, and brushy dry hillsides not far from water. Requires dense undergrowth and moderate cover for breeding. Strong association with riparian habitats in dry forest types. <i>Historic viability: A Current viability: C</i>	1. Fire suppression has led to conifer encroachment in riparian shrub habitats. 2. Source habitats may be degraded by road construction or vegetation treatments. 3. Livestock browsing of riparian shrubs may impact shrub density and recruitment.

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Surrogate species	Status in project area	Habitat family / group and description and species viability rating (Gaines et. al. 2017)	Threats / Management considerations (Gaines et. al. 2017)
marsh wren (<i>Cistothorus palustris</i>)	no suitable habitat	Wetland: Marsh group Preferred nest sites are in large (40+ acres) marshes with dense vegetation interspersed with deep (3+ feet) open water. <i>Historic viability: A Current viability: C</i>	1. Source habitats may be degraded by adjacent road construction or vegetation treatments. 2. Purple loosestrife infestations may reduce nesting habitat effectiveness.
northern bog lemming (<i>Synaptomys borealis</i>)	no suitable habitat	Alpine /boreal: Boreal forest group This species requires a very restricted habitat (high elevation, boreal bogs or fens) that could be sensitive to forest management. It is known to occur in Bunchgrass Meadows in Pend Oreille County.	1. Roads can reduce and fragment habitat. 2. Snow compaction from winter recreation can crush individual animals or expose them to cold temperatures. 3. Livestock grazing can reduce low cover.
northern harrier (<i>Circus hudsonius</i>)	no suitable habitat	Woodland / grass / shrub: Grassland group Harriers are associated with wet or dry, open grassland habitats with tall dense vegetation and abundant residual vegetation. They also use fresh to alkali wetlands, lightly grazed pastures, croplands, fallow fields, old fields, and shrubby areas. They nest on the ground or over water on platforms of cattails or other emergent vegetation. <i>Historical viability: A Current viability: C</i>	1. Agriculture and other human developments can reduce grassland and wetland habitats. 2. Livestock grazing can remove nesting cover for harriers and degrade habitat for small mammal prey. 3. Human disturbance can cause nest abandonment.
pallid bat (<i>Antrozous pallidus</i>)	Suspected	Woodland / grass / shrub family and group Roosts include crevices in rocky outcrops and cliffs, caves, mines, tree boles, cavities in oaks, exfoliating ponderosa pine bark, deciduous trees in riparian areas, and various human structures. Forage over open shrub-steppe grasslands, oak savannah grasslands, open ponderosa pine forests, talus slopes, gravel roads, etc. <i>No viability assessment due to lack of knowledge to adequately map habitat and develop a model at this scale.</i>	1. Use gates and seasonal closures to protect known roost sites. 2. Manage rock features to avoid conflict with recreation use and rock removal. 3. Replace or maintain bridges when bats are absent. 4. Restore native grassland and open ponderosa pine habitats. Maintain large pine snags.

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Surrogate species	Status in project area	Habitat family / group and description and species viability rating (Gaines et. al. 2017)	Threats / Management considerations (Gaines et. al. 2017)
pileated woodpecker (<i>Dryocopus pileatus</i>)	Documented	Medium / large trees: Cool / moist forest group Mature and old-growth forest in Douglas fir or cedar/hemlock cover types, and high densities of large snags and logs. May also use younger forests with scattered large dead trees. <i>Historic viability: A Current viability: C</i>	1. Late stand structure, large diameter live trees, and large snags and logs have been reduced from historic conditions. 2. Dry forest stands tend to have higher tree densities and fuel loads than historic conditions. These stands now have a greater risk of being lost to wildfire (Hessburg et. al. 1999; Townsley et. al. 2004).
sage thrasher (<i>Oreoscoptes montanus</i>)	no suitable habitat	Habitat is sagebrush/shrub-steppe, which does not occur on the CNF.	N/A
tiger salamander (<i>Ambystoma tigrinum</i>)	no suitable habitat	Woodland / grass / shrub: Grass / shrub group Habitat is dry forest with wetlands and ponds at elevations from 670 to 3,000 feet. Important features of breeding sites include persistence of water from mid-March to mid-August, shallow (< 3 feet) water depths in a portion of water bodies, and abundant vegetation along the shoreline. Outside the breeding period they use grassland, shrub-steppe, and open forest habitats. <i>Historic viability: A Current viability: C</i>	1. Stocked fish can prey on juvenile salamanders. 2. Livestock trailing and grazing could remove riparian cover and degrade water quality. 3. Salamanders crossing roads adjacent to occupied habitat may be struck by vehicles. 4. The amount of suitable habitat on the CNF is limited.
western bluebird (<i>Sialia Mexicana</i>)	Suspected	Open forest: All forest group Widely distributed in open, low-elevation coniferous forests (specifically Douglas fir forests), wooded riparian areas, grasslands, farmlands, burn scars, moderately logged areas and edge areas with scattered trees or snags. Limited by the availability of snags with existing cavities. <i>Historic viability: A Current viability: D</i>	1. Grasslands and open forest habitats have often been reduced from historic conditions. 2. Larger diameter (15+ inch) snags used for nesting and roosting have been reduced from historic conditions. 3. Livestock grazing can reduce forage habitat suitability by reducing grass and forb cover.

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Surrogate species	Status in project area	Habitat family / group and description and species viability rating (Gaines et. al. 2017)	Threats / Management considerations (Gaines et. al. 2017)
Wilson's snipe (<i>Gallinago delicata</i>)	Suspected	Wetland: Marsh / wet meadow group Breeding habitat is sedge bogs, fens, and alder or willow wetlands occurring in ponderosa pine, Douglas fir, and grand fir vegetation zones. Wetlands less than 7 acres have limited value as habitat. They forage in shallow water and mudflats. <i>Historical viability: A Current viability: B</i>	1. Loss and degradation of marshes / wetlands
wood duck (<i>Aix sponsa</i>)	Suspected	Riparian: Large tree or snag / open water group This duck nests primarily in late successional forest stands that are adjacent to low gradient rivers, lakes and wetlands. At least 10 acres of aquatic habitat should be available in a contiguous unit for successful nesting. Nests are almost exclusively in tree cavities. Trees must be 12+ inches in diameter to provide suitable cavities. <i>Historic viability: A Current viability: C</i>	1. Decline of wetland habitat 2. Human disturbance reduces the availability of nesting habitat (large snags) and the effectiveness of existing habitat.

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Bird Conservation Regions (BCRs) are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. The Sweet-Ione project lies within the Northern Rockies Bird Conservation Region (BCR 10). Table 24 lists the “landbird focal species for conservation” in the Northern Rocky Mountains of Oregon and Washington (Altman and Bresson 2017). The table does not include birds listed as sensitive or surrogate species for the forest, addressed earlier in this report.

Table 24. Landbird focal species for conservation in the Northern Rocky Mountains of Oregon and Washington (Altman and Bresson 2017). Species in shaded blocks are addressed in this report.

Landbird focal species	Status in project area	Habitat family / group and habitat attribute description	Management considerations
bobolink (<i>Dolichonyx oryzivorus</i>)	No suitable habitat	Wetland: Marsh / wet meadow group Lowland wet meadows in an otherwise arid landscape, irrigated fields	Suitable habitat does not exist in the project area. This species occurs in private fields / pasturelands around the town of Cusick.
calliope hummingbird (<i>Stellula calliope</i>)	common on the CNF	Alpine / boreal: Boreal forest group, and Riparian: Shrubby, deciduous riparian group open shrub / sapling seral stages (8-15 years), meadows, burned areas, and riparian thickets at higher elevations	1. Manage livestock grazing to ensure adequate shrub and flowering plant cover. 2. Protect productive flowering shrublands from encroaching trees and destructive recreation.
chipping sparrow (<i>Spizella passerine</i>)	common on the CNF	Medium large trees; Dry forest group open canopy, short herbaceous ground cover for foraging, moderate understory layer for nesting and cover	1. Conduct thinning or partial overstory removal (non-dry forest species) to provide suitable canopy and ground cover habitat. 2. Manage livestock grazing to ensure adequate ground cover.
Clark’s nutcracker (<i>Nucifraga columbiana</i>)	Suspected	Alpine / boreal: Boreal forest group mature trees for seed production and nesting, xeric, exposed sites for seed caching	1. Conserve / restore whitebark pine tree communities. 2. Reduce habitat conditions conducive to mountain pine beetle and blister rust infestation in adjacent stands to WBP.
flamulated owl (<i>Otus flammeolus</i>)	Suspected	Medium / large trees: Dry forest group broken, heterogeneous canopies, grassland openings for foraging, moderate to large trees for nest / roost sites, small patches of dense thickets for roosting and calling	1. Manage for late open structure with 20 - 50 percent canopy. 2. Provide > 1.2 snags / acre that are > 18 inches DBH. 3. Desired understory layer: 10-30 percent, shrubs 0.5 - 1.2 acre sapling / pole thickets, and 2.5 - 4.9 acre grassy openings.
gray flycatcher (<i>E. wrightii</i>)	No suitable habitat	Woodland / grass / shrub: juniper woodland group mid to late successional juniper woodland	Juniper woodland habitat does not exist within the project area.

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Landbird focal species	Status in project area	Habitat family / group and habitat attribute description	Management considerations
hermit thrush (<i>Catharus guttatus</i>)	common on the CNF	Alpine / boreal: Boreal forest group mature forest with openings, interspersed of herbaceous and shrub cover	1. Promote understory growth through management that breaks up the canopy (timber harvest, prescribed burning). 2. Manage livestock grazing to maintain herb and shrub coverage.
Lincoln's sparrow (<i>Melospiza lincolni</i>)	Suspected	Alpine / boreal: Boreal forest group Wet or mesic alpine / montane meadows with dense herbaceous vegetation and shrub patches	1. Restrict human access and OHV use during the breeding season to minimize nest disturbance / destruction. 2. Manage livestock grazing to ensure adequate vegetation. 3. Manage tree / shrub invasion into meadows.
Nashville, orange-crowned warbler (<i>Oreothlypis ruficapilla</i>), (<i>Vermivora celata</i>)	common on the CNF	Open forest: all forest communities dense understory shrubs for foraging, extensive herbaceous cover for nesting	1. Promote understory growth through natural disturbance or management that breaks up the canopy. 2. Manage livestock grazing to ensure adequate herbaceous and shrub cover, minimize nest disturbance and destruction.
olive-sided flycatcher (<i>Contopus cooperi</i>)	Suspected	Open forest: Post-fire habitat group Open conifer forests (< 40 percent canopy cover) and edge habitats where standing snags and scattered tall trees remain after a disturbance.	1. Limit firewood cutting by closing roads. 2. Retain snags and diseased trees. Create snags if necessary. 3. Promote a shrubby understory with prescribed burning. 4. Manage livestock grazing to ensure adequate shrub cover.
red-eyed vireo (<i>Vireo olivaceus</i>) yellow warbler (<i>D. petechia</i>)	Suspected	Riparian: Shrubby / deciduous riparian group large patches of mature woodland with few to no conifers, closed canopy and sub-canopy with high volume for foraging and nesting, moderate shrub cover	1. Avoid creating openings that are > 25 percent of habitat patches. Maintain hardwood trees. 2. Manage livestock grazing to ensure a diverse shrub understory.
red-naped sapsucker (<i>Sphyrapicus nuchalis</i>)	common on the CNF	Riparian: Shrubby / deciduous riparian group mature woodland dominated by hardwoods, moderate canopy cover, large snags or live trees with heart-rot for nesting	1. Maintain hardwoods. 2. Manage livestock grazing to ensure succession and recruitment of hardwoods. 3. Retain large dead or diseased trees in riparian woodland.

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Landbird focal species	Status in project area	Habitat family / group and habitat attribute description	Management considerations
savannah sparrow (<i>P. sandwichensis</i>)	Suspected	Woodland / grass /shrub: Grassland group upland grasslands or irrigated agricultural fields	1. Manage shrub invasion into meadows. 2. Restrict human disturbance during the nesting season.
Townsend's warbler (<i>Dendroica townsendii</i>)	common on the CNF	Medium / large trees: Cool / moist forest group late successional forest with high canopy cover and foliage volume for nesting and foraging.	1. Manage young forests to develop late-closed conditions. 2. Provide large patches of closed canopy forest, especially on north-facing slopes, wet sites.
vesper sparrow (<i>Pooecetes gramineus</i>)	No suitable habitat	Sagebrush steppe Mosaic of structurally diverse herbaceous vegetation	Sagebrush steppe habitat does not exist in the project area.
warbling vireo (<i>Vireo gilvus</i>)	common on the CNF	Woodland / grass / shrub family and group mature aspen trees for nesting, young trees for recruitment, conifer canopy cover < 10 percent	1. Use prescribed fire to increase aspen regeneration. 2. Manage encroaching conifers to ensure aspen dominance. 3. Manage livestock grazing to ensure aspen recruitment.
western wood pewee (<i>Contopus sordidulus</i>)	Suspected	Open forest: post-fire habitat group Mature woodland with tall trees for nesting, few to no conifers, open mid-story for foraging, forest edges, snags	1. Maintain hardwoods. 2. Manage for < 10 percent conifer cover. 3. Maintain existing snags.
willow flycatcher (<i>Empidonax trailii</i>)	Suspected	Riparian: Shrubby / deciduous riparian group moderate to high (40-80 percent) riparian shrub cover, tree canopy < 20 percent, conifer cover < 10 percent	1. Maintain / restore riparian shrub habitats. 2. Manage livestock grazing to ensure adequate shrub cover for nesting, minimize nest disturbance and destruction.

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2.5.3 *Environmental Consequences*

Table 25 provides a brief summary of the effects of the project to essential habitats for surrogate species listed for the Colville National Forest (USDA 2019), and to landbird focal species listed for the Northern Rocky Mountains of Oregon and Washington (Altman and Bresson 2017). The expected duration of effects would be as follows: short-term = 0-10 years; mid-term = 10-30 years; long term = 30+ years.

Table 25. Summary of project effects to essential habitats of surrogate and landbird focal species

Habitat Family (associated spp.)	Determination	Rationale for Determination
Alpine boreal (calliope hummingbird, Clark's nutcracker, hermit thrush, Lincoln's sparrow)	<i>No Action</i> may impact individuals or habitat but should not contribute to a negative trend in species viability across the forest	Baseline habitat conditions in high-elevation meadows, shrub fields, and timber stands are unlikely to change appreciably over at least the short term. Increasing fuel loads would continue to elevate the risk of large-scale subalpine forest cover loss to high intensity fires. Where soil nutrients are not completely removed by future fires, dense herbaceous and shrub cover would be promoted, important habitat components for calliope hummingbird, hermit thrush and Lincoln's sparrow. Burn scars would provide seed caching sites for Clark's nutcrackers.
Alpine boreal	<i>Proposed Action</i> could contribute to a slight positive trend in species viability across the forest	<p>Subalpine forests - No high-elevation, late structural stage stands would be harvested. Timber harvest would create openings in some stands in middle structural stages, and thin other areas. Mostly dense stands of small diameter trees would be targeted. Prescribed fire would be employed in areas of sparsely timbered shrub fields. These activities would promote vigorous herb and shrub layers over the short term that could be exploited by the landbird focal species associated with this habitat.</p> <p>Cumulative effects - No other timber sales or fuels treatment projects would be active concurrent with the Sweet-Ione project on NFS lands in the Big Muddy and Sweet Creek Watersheds. No other vegetation management projects are planned on NFS lands in these watersheds. See the "Dead Wood Habitats" section of this report for a detailed discussion of cumulative effects to that habitat component. Any other cumulative effects from projects, activities, and uses to alpine boreal habitats on NFS lands (see Appendix A) should be insignificant or discountable.</p> <p>Timber sales on state or private lands would be subject to WA State Forest Practices regulations. There would be no restriction on the harvest of late structural stage stands, or individual large live and dead trees in alpine boreal habitats.</p>
Medium / large trees (American marten, Cassin's)	<i>No Action</i> may impact individuals or habitat but should not contribute to a	It is likely that NFS lands in the Big Muddy and Sweet Creek Watersheds would continue to provide small to medium-sized blocks of mid-late closed forest stands that are well distributed across the watersheds over at least the short term. Late-closed stands (and large trees) would likely remain below historic levels within the Northern Rocky Mountains Mixed Conifer and Spruce / Subalpine fir vegetation types for long periods of time.

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Habitat Family (associated spp.)	Determination	Rationale for Determination
finch, flamulated owl, pileated woodpecker)	negative trend in species viability across the forest	Increasing fuel loads and fuel connectivity would incrementally elevate the risk of high-intensity fires occurring in the area. Such fires could remove medium / large trees at the landscape scale.
Medium / large trees (American marten, Cassin's finch, flamulated owl, pileated woodpecker)	<i>Proposed Action</i> may impact individuals or habitat but should not contribute to a negative trend in species viability across the forest	<p>Medium / large trees (all groups) - The Proposed Action would be designed to maintain enough existing mid-late closed focal species habitat to be within historic levels in the watersheds per Forest Plan Desired Condition: <i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> (page 59). Commercial thinning in areas of late closed, dry site stands would move these stands to a late <i>open</i> condition; a structural stage which is well below historic levels in the watersheds. Post-harvest, the acres of mid-closed stands within the watersheds would still be well above the historic range of variability (HRV) for that structural stage. Landres et al. (1999) and Wisdom et al. (2000) maintained that restoring habitats, both the amount and connectivity, to closer match the historical range of variability, provided considerable improvements in the viability outcomes for native wildlife species.</p> <p>Large trees (20+ inches) would be retained in harvest units consistent with Forest Plan Guideline <i>FW-GDL-VEG-03. Large Tree Management</i> (page 41). Up to 12 "biological legacy trees" per acre that are 14+ inches in diameter would be retained in harvest units, consistent with Forest Plan Desired Condition <i>FW-DC-VEG-05. Biological Legacies</i> (page 37).</p> <p>Prescribed burning would occur within and outside of harvest units. These burns would be completed during weather and fuel moisture conditions that would best ensure low-intensity fire behavior. There should be very few overstory trees killed in treated areas, and insignificant or discountable impacts to canopy closure at the stand level (pers. comm. with E. Trimble 2009).</p> <p>Dead wood - To the extent feasible, all 10+ inch snags and enough 14+ inch down logs would be retained in harvest units to meet Forest Plan Desired Condition <i>FW-DC-VEG-04. Snags and Coarse Woody Debris</i> (page 36). Proposed road closures should locally reduce the loss of standing dead trees to firewood cutting. See the "Dead Wood Habitats" section of this report for a detailed discussion of this habitat component.</p> <p>Habitat connectivity - Approximately 5 miles of open roads would be closed. Selected roads within Riparian Management Areas (RMAs) would be permanently removed from the forest's transportation system and revegetated over time. These actions would be consistent with Forest Plan Desired Condition <i>FW-DC-WL-10. Risk Factors for all Surrogate Species</i> (page 60). The negative impacts of roads on landscape permeability for martens and other wildlife should be reduced as a result.</p> <p>Riparian Management Areas (RMAs) are natural travel routes for furbearers such as martens. Forest management would occur within RMAs <i>only</i> as necessary to confer benefits to riparian-dependent plant and animal species and contribute to connectivity of the watersheds for both riparian and upland species. Existing</p>

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Habitat Family (associated spp.)	Determination	Rationale for Determination
		<p>riparian vegetation would be conserved. A high degree of tree canopy closure would be maintained within the moist vegetation types in RMAs. Thus, the project would be consistent with Forest Plan Guideline <i>FW-GDL-WL-03. Unique Habitats</i> (page 64), and Standard <i>MA-STD-RMA-03. Timber Harvest and Thinning</i> (page 121).</p> <p>Cumulative effects - No other timber sales would be active concurrent with this project or are planned on NFS lands within the Big Muddy and Sweet Creek Watersheds. See the “Dead Wood Habitats” section of this report for a detailed discussion of cumulative effects to that habitat component. Any other cumulative effects from projects, activities, and uses on NFS lands identified in Appendix A should be insignificant or discountable.</p> <p>Timber sales on state or private lands would be subject to WA State Forest Practices regulations. Additional openings could be created on these lands. There would be no restriction on the harvest of large live and dead trees.</p>
<p>Open forest (black-backed woodpecker, fox sparrow, fringed myotis, calliope hummingbird, olive-sided flycatcher, western wood pewee)</p>	<p><i>No Action</i> may impact individuals or habitat but should not contribute to a negative trend in species viability across the forest</p>	<p>The percentage of open forest in the watersheds would likely continue to be below the HRV for this habitat over the long term. Young plantations would continue to grow into middle structural stages, reducing habitat values for fox sparrows and calliope hummingbirds over the short term.</p> <p>Where future fires burn with low to moderate intensity, they would reduce stand density and fuel ladders, and create discrete patches of fire-killed trees. Such fires would promote open shrub / sapling habitats, and open, park-like timber stands. Each of these habitats is utilized by one or more of the surrogate species and landbirds associated with open forests.</p> <p>Increasing fuel loads and fuel connectivity would continue to elevate the risk of high-intensity fires occurring in the area. Such fires could remove large trees and the open forest stands utilized by these species. Large concentrations of fire-killed trees within the burned areas could be exploited by black-backed woodpeckers. Within 2-3 decades, most of these trees would have fallen to the ground. There would then be a decades-long gap in the availability of standing snags in the burn scars until these areas reforest.</p>
<p>Open forest</p>	<p><i>Proposed Action</i> should contribute to a positive trend in species viability across the forest</p>	<p>Open forest: All forest group - Timber harvest and fuels reduction work would reduce the potential for hot crown fires to occur in the watersheds. Commercial thinning would convert some dry site, late closed stands to a <i>late open</i> condition. This structural stage is well below its historic range of variability in the watersheds. Commercial thinning in dry site, mid-closed stands would set the stage for the accelerated development of additional open, park-like stands over time, consistent with Forest Plan Desired Condition <i>FW-DC-WL-03. Habitat Conditions for all Surrogate Species</i> (page 59).</p> <p>Large live trees (20+ inches) would be retained in harvest units per Forest Plan Guideline <i>FW-GDL-VEG-03. Large Tree Management</i> (page 41). Up to 12 “biological legacy trees” per acre that are 14+ inches in diameter would be retained in harvest units, consistent with Forest Plan Desired Condition <i>FW-DC-VEG-05. Biological Legacies</i> (p. 37).</p> <p>Open forest: Early successional group - Shelterwood and group selection harvest would create openings in</p>

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Habitat Family (associated spp.)	Determination	Rationale for Determination
		<p>the forest canopy and increase forest edge habitats. Slash within some of the harvested units would be treated with prescribed fires. Areas outside of harvest units would also be under-burned. These vegetation treatments would tend to promote the robust growth of stand understories. Dense shrub stage conditions favored by fox sparrow and calliope hummingbird should develop on many of these sites over the short term. Riparian vegetation would be protected by avoidance.</p> <p>Dead wood - To the extent feasible, all 10+ inch snags and enough 14+ inch down logs would be retained in harvest units to meet Forest Plan Desired Condition <i>FW-DC-VEG-04. Snags and Coarse Woody Debris</i> (page 36). Proposed road closures should locally reduce the loss of standing dead trees to firewood cutting. See the “Dead Wood Habitats” section of this report for a detailed discussion of this habitat component.</p> <p>Cumulative effects - No other timber sales would be active concurrent with this project or are planned on NFS lands within the Big Muddy and Sweet Creek Watersheds. See the “Dead Wood Habitats” section of this report for a description of potential cumulative effects to that habitat component. Any other cumulative effects from projects, activities, and uses to open forest habitats on NFS lands (see Appendix A) should be insignificant or discountable.</p> <p>Timber sales on state or private lands would be subject to WA State Forest Practices regulations. Additional openings could be created on these lands. There would be no restriction on the harvest of large live and dead trees in open forest habitats.</p>
Woodland / grass / shrub (golden eagle, pallid bat, savannah sparrow, warbling vireo)	<i>No Action</i> may impact individuals or habitat but should not contribute to a negative trend in species viability across the forest	<p>Baseline habitat conditions likely maintained over at least the short term.</p> <p>Increasing fuel loads would continue to elevate the potential for large-scale woodland cover loss to high intensity fires. Future fires could create additional grass / shrub habitats utilized by these species.</p>
Woodland / grass / shrub	<i>Proposed Action</i> should contribute to a positive trend in species viability across the forest	<p>Timber harvest and fuels reduction treatments would reduce the potential for fire starts / spread into source habitats.</p> <p>Grass / shrub habitats - Grass meadows / fields are uncommon in the project area and should not be affected by timber harvest. A proposed habitat improvement project would remove encroaching young conifers from two old homestead meadows. The intent would be to prevent these sites from converting to forest land over time. Forest openings would be created within areas proposed for shelterwood and group selection harvest. Where prescribed burning occurs in open shrub habitats, encroaching young conifers would be removed and open conditions would tend to be perpetuated. Grass / shrub openings that are maintained or created by the</p>

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Habitat Family (associated spp.)	Determination	Rationale for Determination
		<p>project could provide foraging opportunities for golden eagles.</p> <p>Open forest - See the discussion on this habitat family earlier in this table.</p> <p>Dead wood – Large snags would not be marked for harvest, consistent with Forest Plan Standard <i>FW-STD-WL-12. Large Snag Habitat</i> (page 42). Also see the “Dead Wood Habitats” section of this report.</p> <p>Rock features - The Sweet-Ione project would have no effect on cliffs, talus or other rock features used by golden eagles and pallid bats for nesting or roosting.</p> <p>Cumulative effects – No other timber sales would be active concurrent with this project or are planned on NFS lands within the Big Muddy and Sweet Creek Watersheds. See the “Dead Wood Habitats” section of this report for a description of potential cumulative effects to that habitat component. Any other cumulative effects from projects, activities, and uses to woodland / grass / shrub habitats on NFS lands (see Appendix A) should be insignificant or discountable.</p> <p>Timber sales on state or private lands would be subject to WA State Forest Practices regulations. Additional openings could be created on these lands. There would be no restriction on the harvest of large live and dead trees.</p>
<p>Riparian & Wetlands (Columbia spotted frog, calliope hummingbird, willow flycatcher, red-eyed vireo, red-naped sapsucker, wood duck, MacGillivray’s warbler, Wilson’s snipe)</p>	<p><i>No Action</i> may impact individuals or habitat but should not contribute to a negative trend in species viability on the forest</p>	<p>Existing riparian habitat conditions likely maintained for the foreseeable future. Increasing fuel loads would continue to elevate the risk of riparian forest / shrub habitat loss to high intensity fires.</p> <p>Many stream reaches would continue to lack in-stream habitat complexity due to the low potential for large woody debris recruitment.</p> <p>The road network would continue to locally impact riparian function and connectivity. Roads which were built directly adjacent to streams could contribute sediments to the water column. Riparian tree and shrub habitats would be precluded from development in the road prisms. Where these roads are presently open to public use, they would continue to facilitate unauthorized fuelwood cutting along streams. Certain culverts would continue to impair the passage of aquatic organisms under roads.</p>

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Habitat Family (associated spp.)	Determination	Rationale for Determination
Riparian & Wetlands	<p><i>Proposed Action</i></p> <p>should contribute to a positive trend in species viability across the forest</p>	<p>Habitat integrity – Maximum widths for Riparian Management Areas (RMAs) are provided on page 119-120 of the Forest Plan. Forest management would occur within RMAs <i>only</i> as necessary to confer benefits to riparian-dependent plant and animal species, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, and contribute to connectivity of the watershed for both riparian and upland species. Thus, the project would be consistent with Forest Plan Guideline <i>FW-GDL-WL-03. Unique Habitats</i> (page 64), and Standard <i>MA-STD-RMA-03. Timber Harvest and Thinning</i> (page 121).</p> <p>Specific to RMAs, the Sweet-Ione project would:</p> <ul style="list-style-type: none"> • conserve all existing riparian vegetation, • maintain an average 60+ percent tree canopy closure in harvest units in the mesic vegetation types, • retain all large (20+ inch) live trees, and up to 12 “biological legacy trees” per acre of harvest, • permanently remove un-needed roads from RMAs, and revegetate the road prisms, • upgrade culverts where necessary to restore aquatic organism passage under roads, • improve stream habitat complexity and raise water tables by installing large woody debris “jams” in the stream channel. <p>Timber harvest and fuels treatments in upland areas should reduce future fire intensity and the potential for fire spread into RMAs. Prescribed burns proposed with the project would be started <i>outside</i> of RMAs and would be completed under fuel moisture and weather conditions intended to ensure low intensity fire behavior. While prescribed fires may back into RMAs in some locations, we expect any impacts to riparian vegetation would be quite local, short-term, and insignificant or discountable at the stand scale.</p> <p>Dead Wood - To the extent feasible, all 10+ inch snags and enough 14+ inch down logs would be retained in harvest units to meet Forest Plan Desired Condition <i>FW-DC-VEG-04. Snags and Coarse Woody Debris</i> (page 36). Personal fuelwood cutting is prohibited within RMAs per Forest Plan Standard <i>MA-STD-RMA-02. Personal Fuelwood Cutting</i> (page 121). The removal of road segments from RMAs would reduce the potential for snag loss to unauthorized wood cutting.</p> <p>Cumulative effects - No other timber sales would be active concurrent with this project or are planned on NFS lands within the Big Muddy and Sweet Creek Watersheds. Timber sales on state or private lands would be subject to WA State Forest Practices regulations. Residual canopy closure might not be a consideration within harvest units in RMAs on those lands. Fewer trees would be required to be left standing in RMAs, and there would be no restriction on the harvest of large live and dead trees.</p> <p>We do not expect livestock access in RMAs would be appreciably improved with the Sweet-Ione project, due to the avoidance of riparian vegetation, the retention of most live trees and down logs in RMAs, and habitat</p>

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Habitat Family (associated spp.)	Determination	Rationale for Determination
		improvements such as the placement of large wood in stream channels.

2.6 Dead Wood Habitats

2.6.1 Management Framework

2.6.1.1 *Forest Plan Desired Conditions, Standards, and Guidelines*

FW-DC-VEG-04. Snags and Coarse Woody Debris (page 36)

Snags and down logs to occur in sizes, amounts, and distributions to provide important wildlife habitats and contribute to ecosystem services. This desired condition applies to all forested habitats except those in Administrative and Recreation Sites Management Areas. Forest Plan desired conditions for snags and down wood are measured on National Forest System lands at the watershed scale and quantified in the following tables.

Table 26. Desired amounts and spatial arrangement of snags by forest vegetation types

Forest Vegetation Type	Small ¹ Snags per acre by Density Class ³	Large Snags ² per acre by Density Class ⁴
Dry Douglas fir		
Low Density Class	< 4	< 2
Moderate Density Class	4-8	2-4
High Density Class	> 8	> 4
Northern Rocky Mountains Mixed Conifers		
Low Density Class	< 6	< 4
Moderate Density Class	6-10	4-9
High Density Class	> 10	> 9
Western Hemlock / Western Red Cedar		
Low Density Class	< 8	< 3
Moderate Density Class	8-15	3-6
High Density Class	> 15	> 6
Subalpine fir / Lodgepole		
Low Density Class	< 8	< 3
Moderate Density Class	8-14	3-6
High Density Class	> 14	> 6
Spruce / Subalpine fir		
Low Density Class	< 9	< 3
Moderate Density Class	9-16	3-6
High Density Class	> 16	> 6

1/ Small snags = 10-20 inches DBH for all vegetation types except Subalpine fir / Lodgepole, where they are 8-15 inches DBH.

2/ Large snags = > 20 inches DBH for all vegetation types except Subalpine fir / Lodgepole, where they are > 15 inches DBH.

3/ The desired proportions of the snag density classes for small snags measured at the watershed scale are:

Low Density Class = < 50% of the area, Moderate Density Class = 25-45% of the area, High Density Class = 5-25% of the area.

4/ The desired proportions of the snag density classes for large snags measured at the watershed scale are:

Low Density Class = < 50% of the area, Moderate Density Class = 35-45% of the area, High Density Class = 5-15% of the area.

Table 27. Desired amounts of coarse woody debris (CWD) by forest vegetation types

Forest Vegetation Type	Coarse Woody Debris (Minimum Levels)	Coarse Woody Debris (High Levels)
Douglas fir Dry		
Tons / acre	3	7
Small logs / acre ¹	29 DF or 34 PP	68 DF or 78 PP
Large logs / acre ²	6 DF or 7 PP	14 DF or 16 PP
Northern Rocky Mountains Mixed Conifer		
Tons / acre	5	10
Small logs / acre	43 WL or 49 DF or 61 GF	86 WL or 98 DF or 122 GF
Large logs / acre	9 WL or 10 DF or 12 GF	18 WL or 20 DF or 24 GF
Western Hemlock / Western Red Cedar		
Tons / acre	25	40
Small logs / acre	159 WH or 224 WRC	254 WH or 390 WRC
Large logs / acre	32 WH or 44 WRC	51 WH or 70 WRC
Subalpine fir / Lodgepole		
Tons / acre	16	40
Small logs / acre	167 SAF or 175 LP	418 SAF or 438 LP
Large logs / acre	33 SAF or 35 LP	83 SAF or 88 LP
Spruce / Subalpine fir		
Tons / acre	5	12
Small logs / acre	64 ES or 70 SAF	154 ES or 168 SAF
Large logs / acre	13 ES or 14 SAF	31 ES or 34 SAF

1/ Approximate numbers of small logs / acre required to meet the desired range. Small logs are 10 inches in diameter on large end and over 16 feet long.

2/ Approximate numbers of large logs / acre required to meet the desired range. Large logs are 16 inches in diameter on large end and over 33 feet long.

In 2003, the Forest Service released “DecAID”, an internet-based tool developed to help land managers evaluate the effects of forest management on wildlife species that use dead wood habitats. DecAID was last updated in 2017 (Mellen-McLean et al. 2017). DecAID provides forest inventory data for dead wood habitats on the national forests of Oregon and Washington. It is a tool that synthesizes published literature, research data, wildlife databases, and expert judgment and experience.

Forest Plan desired conditions for snag levels were adapted from information provided in DecAID and “are intended to provide for a relatively high contribution to the viability of snag dependent, surrogate wildlife species” (Gaines 2018).

Forest Plan desired conditions of downed wood levels are consistent with findings in the literature that pertain to maintaining long term site productivity, wildlife habitats, and other long term ecological and biological legacy functions. They are also consistent with local and regional research on historic conditions (Everett et al. 1999, Graham et al. 1994, Harrod et al. 1998, Harvey et al. 1987, Lee et al. 1997, Mellen-McClean et al. 2017, Reynolds et al. 1992, Robertson and Bowser 1999, Thomas et al. 1979).

FW-DC-VEG-05. Biological Legacies (page 37)

Large trees, snags, hollow trees, down logs, root wads, and other structures important for wildlife habitat are represented across the landscape to support wildlife, aquatic and soil resources, and support recovery processes in the post disturbance ecosystem.

FW-STD-WL-12. Large Snag Habitat (page 64)

This standard provides for the retention of snags that are 20+ inches in diameter unless they pose a safety hazard. This standard does not apply within developed recreation sites (e.g., campgrounds), administrative sites, around recreation residences, and within 200 feet of open roads designated for firewood harvest.

2.6.2 Existing Conditions

Snags

Bird species classed as “primary cavity nesters” create holes in snags or defective live trees each year to serve as nest sites (Thomas et al. 1979). Two surrogate species (black-backed and pileated woodpeckers) and one landbird of conservation concern (Williamson’s sapsucker) are primary excavators. Many other wildlife species use the older, abandoned cavities for shelter or reproduction (Thomas et al. 1997). These “secondary cavity users” include three surrogate species (American marten, western bluebird, and wood duck) and one landbird of conservation concern (flamulated owl). Two surrogate bat species (fringed myotis and pallid bat) use the crevices behind the sloughing bark of snags as day roost sites. Standing dead and defective live trees attract the insects upon which woodpeckers and other wildlife species feed. Larger trees are of higher value because they are used by more species for roosting, foraging, and nesting (Bull et al. 1997, Mellen-McLean et al. 2017). Bull et al. (1997) stated “when retaining snags for cavity nesters, ponderosa pine, western larch, quaking aspen, and paper birch are the favored species in many localities.”

Table 28 contains data synthesized in DecAID from various studies relating wildlife use of snags to tree size. Data is provided by forest habitat type in middle structural stages, where most of the proposed timber harvest with the Sweet-Ione project would occur. The table displays three population tolerance levels for each wildlife species related to snag size. For example, snags that are 36.4 inches DBH would provide for 80 percent of the pileated woodpecker population in mixed conifer habitats (based on research conducted in those habitat types). Snags that are 29.8 inches DBH would provide for only 50 percent of the population. In other words, larger snags can accommodate a greater percentage of the nesting population of pileated woodpeckers.

Table 28. Diameters of snags required by wildlife species studied for nesting / denning by forest type in mid-structural stages (compiled from DecAID Tables: PPDF_M sp-1, EMC_M sp-1, and MMC_M sp-1)*

Species (habitat use)	Ponderosa pine / Douglas fir			N. Rocky Mtns. Mixed Con.			Montane Mixed Conifer		
	30%	50%	80%	30%	50%	80%	30%	50%	80%
American marten (denning)	21.0	31.9	47.0	21.0	32.5	47.0	27.5	35.2	54.3
black-backed wood. (nesting)	8.2	13.3	20.7	8.8	12.1	16.9	8.9	11.0	14.1
flamulated owl (nesting)	22.1	26.0	31.7	20.7	24.8	30.8	No data	No data	No data

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Species (habitat use)	Ponderosa pine / Douglas fir			N. Rocky Mtns. Mixed Con.			Montane Mixed Conifer		
fringed myotis (roosting)	18.9	32.5	51.0	No data	No data	No data	No data	No data	No data
pileated woodpecker (nesting)	25.8	30.4	37.2	25.4	29.8	36.4	No data	No data	No data
white-headed wood. (nesting)	20.1	25.7	34.7	21.0	27.0	36.3	No data	No data	No data
Williamson's sapsucker (nesting)	19.5	24.4	32.0	19.6	24.6	32.2	No data	No data	No data

*Tolerance level for snag diameter (inches)

Table 29 contains data synthesized in DecAID from various studies relating snag density to wildlife use. Data is provided by forest habitat type in middle structural stages, where most of the proposed timber harvest in the Sweet-Ione Project Area would occur. The table displays three population tolerance levels for each species related to snag density. For example, small snag densities of 28.7 trees per acre would provide for 80 percent of the black-backed woodpecker population. Small snag densities of 13.4 trees per acre would provide for only 50 percent of the population. In other words, greater densities of snags can accommodate a greater percentage of the nesting population of black-backed woodpeckers.

Table 29. Snag densities required by wildlife species studied at nest, roost, or den sites (compiled from DecAID Tables PPDF_M sp-3, EMC_M sp-3, and MMC_M sp-3)*

Species (habitat use)	Small snags (10-19.9 inch)			Large snags (20+ inch)		
	30%	50%	80%	30%	50%	80%
American marten (denning)	0	13.0	74.8	0	4.0	22.9
black-backed wood. (nesting)	2.4	13.4	28.7	0	1.5	5.8
pileated woodpecker (nesting)	15.8	29.9	49.7	3.6	8.0	18.6
white-headed wood. (nesting)	0	6.4	18.5	0.3	1.5	3.5
Williamson's sapsucker (nesting)	13.8	28.0	48.9	3.1	8.5	16.5

* Tolerance level for snag density (trees per acre)

It is apparent from Table 29 that fewer large snags are required to sustain a given species population level. It is important to note that most of the data in the table were recorded at nest, roost, or den sites.

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“Snag densities at these sites were often higher than snag densities in random plots in the surrounding stand. This difference might indicate that wildlife use or perhaps select for clumps of snags... Extrapolating the snag densities from such sample plots to a per-hectare basis may yield very high snag densities that may not be appropriately interpreted as stand-wide averages or management objectives” (Mellen-McLean et al. 2017).

Existing Snag Levels - Snags are absent in the non-forested portions of the project area. These sites include rock features, shrub fields, meadows, fields, pastures, powerline corridors, roads, and open wetlands. Non-forested areas cover at least 644 acres (1.5 percent) of the watersheds. Snags typically occur in low numbers in areas of past regeneration harvest (e.g., clearcut, shelterwood), particularly on private and state lands. Past regeneration harvest on NFS lands mostly occurred in the 1970s - 1990s. Typically, an average of 2 snags and 8 green reserve trees were retained per acre were harvested. Regeneration harvest on all ownerships covers about 8,979 acres (20.3 percent) of the watersheds. Firewood cutting is allowed within 200 feet of open forest roads on NFS lands. Snag levels are typically reduced where wood cutting occurs, particularly on slopes that are less than 35 percent.

We completed a dead wood distribution analysis using data provided by DecAID over the Cedar Creek-Pend Oreille River Watershed, the 10th order watershed the Sweet-Ione Project falls within. This analysis uses Gradient Nearest Neighbor (GNN) map layers of current dead wood densities, which are derived from Landsat imagery and data from permanent Forest Inventory Assessment plots. We determined current snag densities across the Lodgepole Pine, Northern Rocky Mountains Mixed Conifers, and Montane Mixed Conifers habitat types, which cover a high percentage of the watershed. DecAID does not provide information for the Douglas fir - Dry habitat type in the Cedar Creek - Pend Oreille River Watershed, likely due to the relative scarcity of this type. We compared the Forest Plan desired conditions for snag densities with the existing conditions in the watersheds in Table 30.

Table 30. Comparison of Forest Plan desired conditions to existing conditions of snag densities
(all values are approximate)

Habitat Type	Small Snags			Large Snags		
	0-8	8-14	>14	0-3	3-6	>6
Lodgepole Pine (Subalpine fir / lodgepole vegetation types) Small: 8-15" DBH Large: >15" DBH Forest Plan snag density class (snags per acre)						
Forest Plan Desired Condition (% of watersheds)	<50%	25-45%	5-25%	<50%	35-45%	5-15%
Current % of the watersheds	96%	4%	0%	96%	4%	0%
N. Rocky Mtns. Mixed Conifers (also includes W. redcedar / W. hemlock vegetation type) Small: 10-19.9" DBH Large: >20" DBH Forest Plan snag density class (snags per acre)	0-6	6-10	>10	0-4	4-9	>9

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Habitat Type	Small Snags			Large Snags		
Forest Plan Desired Condition (% of watersheds)	<50%	25-45%	5-25%	<50%	35-45%	5-15%
Current % of watersheds	35%	26%	39%	89%	10%	1%
Montane Mixed Conifers (Subalpine fir / Spruce veg. type) Small: 10-19.9" DBH Large: >20" DBH Forest Plan snag density class (snags per acre)	0-9	9-16	>16	0-3	3-6	>6
Forest Plan Desired Condition (% of watersheds)	<50%	25-45%	5-25%	<50%	35-45%	5-15%
Current % of watersheds	55%	21%	24%	79%	14%	7%

As displayed in the preceding table, small snag densities appear to roughly meet or exceed Forest Plan desired conditions in Northern Rocky Mountains Mixed Conifers and Montane Mixed Conifers habitat types. This could be due to the surplus of stands in middle structural stages relative to historic conditions, and density-dependent tree mortality factors at work in these stands. Small snag densities in these habitat types appear capable of providing for the 50 to 80 percent population levels of American marten, black-backed woodpeckers, and white-headed woodpecker in these habitats, and at least the 30 percent population level of pileated woodpeckers. Small snags are well below Forest Plan desired conditions in the Lodgepole Pine Habitat Type.

Existing densities of large snags appear to be below Forest Plan desired conditions across all habitat types. Large snag densities in the Northern Rocky Mountain Conifers and Montane Mixed Conifers habitat types appear capable of providing for somewhere between the 30 and 50 percent population levels of American marten, black-backed woodpecker, and white-headed woodpecker, in these habitats, and at least the 30 percent population level of pileated woodpeckers and Williamson's sapsuckers.

Down Logs

Down logs provide denning, resting and foraging sites for a host of wildlife species (Mellen-McLean et al. 2017). They provide shelter for ant colonies and other invertebrates, and cover for ground nesting birds. Log piles provide access points for American martens to hunt rodents under the snow (Wisdom et al. 2000).

Table 31 displays information synthesized in DecAID, from studies relating down log sizes to wildlife use. Data is provided by forest habitat type in middle structural stages, where most of the proposed timber harvest in the Sweet-Ione Project Area would occur.

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Table 31. Down log sizes required for nesting / resting / foraging by wildlife species studied by forest type
(compiled from DecAID Figures PPDF_M sp-6, EMC_NCR_M sp-6, and MMC_M sp-6)*

Species (habitat use)	Ponderosa pine / Douglas fir			NRM Mixed Conifer			Montane Mixed Conifer		
	30%	50%	80%	30%	50%	80%	30%	50%	80%
American marten (resting)	No data	No data	No data	21.0	26.0	33.6	20.9	26.0	33.6
large ant spp. (colony)	7.0	9.7	13.8	4.9	10.4	18.9	No data	No data	No data
small ant spp. (colony)	7.6	10.2	14.2	5.3	10.4	18.4	No data	No data	No data
woodpeckers (foraging)	7.7	10.3	14.3	5.3	11.3	20.6	No data	No data	No data

* tolerance level for down log diameter (inches)

Table 32 contains data synthesized in DecAID from various studies relating down log density to use by the wildlife species studied.

Table 32. Down log densities required by wildlife species studied

(compiled from DecAID Tables PPDF_M. sp-4, EMC_M. sp-4, MMC_M. sp-4)*

Species (habitat use)	Ponderosa pine / Douglas fir			NRM Mixed Conifer			Montane Mixed Conifer		
	30%	50%	80%	30%	50%	80%	30%	50%	80%
Am. marten (denning)	No data	No data	No data	No data	No data	No data	No data	No data	No data
black-backed woodpecker (presence)	No data	No data	No data	4.7%	13%	25.1%	No data	No data	No data
black bear (presence)	No data	No data	No data	No data	2.6%	No data	No data	No data	No data
Canada lynx (denning)	No data	No data	No data	No data	No data	No data	1.3%	5.0%	10.4%
northern 3-toed woodpecker (presence)	No data	No data	No data	6.5%	17%	32%	6.5%	17.0%	32%
pileated wood. (presence)	No data	No data	No data	3.9%	4.2%	4.6%	No data	No data	No data

* tolerance level for percent of down wood cover (>= 6 inches)

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Existing Down Log Levels - As is the case with standing snags, down logs are absent or have been reduced in portions of the project area including non-forested areas, state and private lands, and older created openings on NFS lands. Down log levels have also been reduced along roads open to firewood cutting, although to a much lesser degree than standing snags.

The following tables display the approximate current levels of 5-19.9 inch and 20+ inch down logs in the Cedar Creek - Pend Oreille River Watershed, derived from GNN maps. The Forest Plan provides desired conditions for down logs in tons per acre, rather than expressed as a log density class over a percentage of the landscape. Therefore, we compared the current densities of logs in the watershed with reference conditions (HRV) provided by DecAID.

Table 33. Comparison of reference range of conditions (HRV) to existing conditions for distribution of 5 - 19.9 inch down logs (approximate values)

Lodgepole pine (Subalpine fir / Lodgepole pine vegetation type)

small logs

Log density class (logs per acre)	0	0-2	2-4	4-6	6-10	>10
reference (% of watersheds)	11%	27%	27%	14%	15%	7%
current	0%	7%	25%	34%	29%	5%

Northern Rocky Mountains Mixed Conifers (includes W. redcedar / W. hemlock veg. types)

small logs

Log density class (logs per acre)	0	0-2	2-4	4-6	6-8	>8
reference (% of watersheds)	18%	47%	16%	6%	9%	4%
current	1%	15%	37%	19%	16%	12%

Montane Mixed Conifers (Spruce / Subalpine fir vegetation type)

small logs

Log density class (logs per acre)	0	0-2	2-4	4-6	6-10	>10
reference (% of watersheds)	12%	28%	20%	15%	16%	10%
current	28%	45%	22%	5%	0%	0%

Table 34. Comparison of reference range of conditions (HRV) to existing conditions for distribution of 20+ inch down logs (calculated from GNN map)

Lodgepole pine (Subalpine fir / Lodgepole pine vegetation type)

large logs

Log density class (logs per acre)	0	0-1	1-2	2-3	3-4	>=4
reference	84%	13%	2%	2%	0%	0%
current	95%	5%	0%	0%	0%	0%

Northern Rocky Mountains Mixed Conifers (includes W. redcedar / W. hemlock veg. types)

large logs

Log density class (logs per acre)	0	0-1	1-2	2-3	3-4	>=4
Reference (% of watersheds)	58%	17%	13%	7%	4%	1%
current	44%	23%	22%	6%	2%	3%

Montane Mixed Conifers (Subalpine fir / Spruce vegetation type)

large logs

Log density class (logs per acre)	0	0-2	2-4	4-6	6-8	>=8
reference	52%	22%	15%	6%	2%	2%
current	28%	45%	22%	5%	0%	0%

As displayed in the preceding tables, existing levels of logs 5-19.9 inches in diameter appear to be well above the historic range of variability for the Lodgepole Pine and Northern Rocky Mountains Mixed Conifers habitat types. Existing levels of logs in this size range appear to be below HRV reference conditions in the Montane Mixed Conifer habitat type.

Levels of large diameter logs appear to be above HRV reference conditions in the Northern Rocky Mountains Mixed Conifer habitat type. Logs of this size class are similar with, or slightly above HRV in the Montane Mixed Conifer type. Large logs are well below reference conditions in the Lodgepole Pine habitat type.

In general, log densities seem capable of providing for 80 percent of the population of black-backed, northern 3-toed, and pileated woodpeckers in the watershed.

2.6.3 Environmental Consequences

2.6.3.1 Direct and Indirect Effects of No Action

Snags and logs would continue to be recruited from insect and disease attack, and drought stress in stands across the project area. Densities of large (20+ inch) snags would likely continue to be below historic levels over long periods of time. Where immature stands are overly dense and stagnated, few or no large trees (and consequently, large snags and logs) are likely to ever be produced.

With continued fire suppression, dense patches of young firs and other conifers would continue to grow into the overstory canopy of many stands in the project area. Armillaria root rot would continue to kill mature fir trees and could increase in the project area over time with increasing tree stocking. Trees weakened by root rot would be pre-disposed to successful attack by Douglas fir bark beetles. Hardwoods would continue to decline due to increasing senescence and competition with growing conifers for site resources.

These processes would result in accumulating ground fuels and increasingly continuous fuel ladders from the understory up into the overstory tree canopy. As a result, the risk of large scale, stand-replacing fires would increase in the project area over time. Such events would reduce habitat for species that require more overhead tree canopy (e.g., pileated woodpecker, flammulated owl, Williamson's sapsucker). A large pulse of snags would be created in intensely burned areas that could be exploited by some cavity nesters (e.g., black-backed woodpecker, western bluebird). Within 2-3 decades most of these trees would

have fallen to the ground. There would then be a long-term gap in the availability of new snag habitat in the burn scar, while the area becomes reforested.

2.6.3.2 Direct and Indirect Effects of the Proposed Action

Effects of Timber Harvest to Snags - Proposed timber harvest and prescribed burning would reduce forest fuels loads and fuel continuity. This would reduce the potential for fire spread and pathways for a ground fire to ascend into the overstory tree canopy. The Proposed Action would move the landscape closer to its historic fire regime. The supply of snags would be less subject to “boom and bust” cycles and should become more stable / continuous over time (Spies et al. 1988, in Agee 2002).

Commercial thinning proposed should accelerate the development of large trees in the project area (Bailey and Tappeiner 1998). In a study of thinning effects on stand development in western Oregon, thinning “increased stand structural variability, moved stands toward multi-level canopies, and increased residual tree growth” (Dodson et al. 2012). However, these authors suggested that thinning alone would not create large snags and coarse woody debris, and that specific actions “may be needed to ensure accelerated development of these late successional structural features.”

Standing snags located within new road or equipment corridors and log landings would, by necessity, be removed. With Forest Service timber sales, it is standard practice to re-use old equipment corridors and landings to the extent possible. Snags that pose a safety hazard to workers might need to be cut down. We expect that mechanical harvesters would be used on most of the acres logged. This logging method maximizes the ability to retain existing snags, since the machine operator can cut and *place* trees on the ground with precision, while being protected from any falling material inside the vehicle cab. Standing snags 14+ inches in diameter that must be cut down with the project would be left on site to contribute to down log levels, as feasible for equipment operation.

No large diameter (20+ inches DBH) snags would be marked for removal within harvest units, consistent with Forest Plan Standard *FW-STD-WL-12. Large Snag Habitat* (page 64). Following the project there would be a short to mid-term reduction in snag recruitment in harvest units. This is because logging would remove many of the live trees that might otherwise have died over time due to inter-tree competition, senescence, or other mortality factors. Most of this potential habitat would consist of small diameter trees. To offset this impact to snag recruitment, existing small diameter snags (10-19.9 inches DBH) would be retained within harvest units, even though densities of these trees often exceed desired levels identified in the Forest Plan.

Soon after logging, the Forest Service would assess the need to create additional snags to meet Forest Plan desired conditions in individual shelterwood harvest units. In the last 25 years, we have successfully created thousands of snags by chainsaw topping or top girdling live trees.

Existing restricted (gated) roads, brushed-out roads, and new temporary roads used for this project would remain closed to the public both during and after project activities. Dead wood habitats should remain mostly inaccessible to firewood cutters within these road corridors. The project would include the closure of approximately 5 miles of roads that are presently open, reducing the potential for habitat loss to woodcutters in the affected road corridors.

Effects of Timber Harvest to Logs - All existing logs that are in later stages of decay would be left on site in harvest units as they have no commercial value. The timber sale contract would provide for the retention of all logs that are 14+ inches at the large end, as well as enough additional smaller pieces to meet the levels prescribed in Forest Plan Desired Condition *FW-DC-VEG-04. Snags and Coarse Woody Debris* (page 36). Some sound logs retained to meet coarse woody debris requirements would need to be cut and / or moved to facilitate equipment operation.

Following harvest, some retained over-story trees might be wind-thrown. This is most likely to occur to single trees or groups of trees retained within created openings. Full-crowned trees on slope positions exposed to strong gusts may be the most vulnerable. Wind-thrown trees would contribute to down log levels.

Effects of Fuels Treatments to Dead Wood - Mechanical fuels treatments would impact seedling - sapling sized trees only. These treatments would have insignificant or discountable effects to dead wood habitats. Hand or machine piling and pile burning would target smaller diameter ground fuels and should not appreciably impact down logs that are 10+ inches in diameter. A few green trees directly adjacent to burn piles could be injured or killed from root or crown heating.

Low-severity, prescribed fire would be employed both within and outside of harvest units. Dependent on the continuity of fuels, treated areas could be mostly blackened, or a mosaic of burned and un-burned sites. On burned sites, 90 percent of the small fuels (0 - 1.0 inch) would be consumed. Larger diameter fuels (1.0 - 3.0+ inches) would be consumed in relation to their diameter and moisture content. Some larger down logs are likely to be consumed at least partially, as are some standing snags.

Immediate, post-fire mortality of the overstory trees should be a small percentage of the tree basal area per acre (pers. comm. with E. Trimble 2009). Some thin-barked and fire sensitive over-story trees (e.g., lodgepole pine, grand fir) would be killed outright. There could be some degree of scorch damage on up to 40 percent of the green trees in a burned unit, but a low percentage would be expected (pers. comm. with E. Trimble 2009). Trees injured but not killed by prescribed fires could develop heart rot or other defects that could provide opportunities for cavity excavation. We expect there would be a small net gain in snag numbers in areas that are under-burned, based on our past monitoring (pers. comm. with E. Trimble 2009).

Effects to Hardwoods - Hardwood trees would be retained within harvest units to the extent feasible, consistent with Forest Plan Desired Condition *FW-DC-VEG-01. Plant Species Composition* (page 34), and Guideline *FW-GDL-WL-03. Unique Habitats* (page 64). These trees are favored by many cavity excavator species (Bull et al. 1997) and landbirds such as warbling vireo and red-naped sapsucker.

Where timber harvest removes conifer trees growing amongst hardwoods, the hardwoods would experience reduced competition for sunlight, water, and soil nutrients. There would be an increase in solar radiation striking the forest floor, stimulating aspen to produce new sprouts from their root systems. Where prescribed fire is employed, the above-ground portions of aspen and birch trees are likely to be killed through direct flame contact or crown heating. However, profuse basal or root sprouting of these trees is likely to occur soon after burning. Over time, the density and overall extent of hardwood patches could increase in the project area, eventually providing high quality cavity excavator and landbird habitat as the trees mature.

2.6.3.3 Cumulative Effects – Proposed Action

The cumulative effects analysis area for dead wood habitat is the Big Muddy and Sweet Creek Watersheds.

In pre-settlement times, the watersheds contained greater numbers of large trees and more extensive old forest patches than is the case today. In the 1920s and 1930s, intense, large-scale wildfires burned over much of the watersheds and adjacent areas. These fires may have been fueled by untreated slash concentrations in areas of timber harvest and homestead clearing. The fires removed many stands in late structural stages and diminished the numbers of large, live trees across the landscape. They created a large “pulse” of snags, but most of this habitat fell to the ground after a few decades. Since the time of these catastrophic fires, wildfire starts have been aggressively suppressed by the Forest Service and WA State Department of Natural Resources. This policy has had the unintended consequence of allowing

many stands to accumulate heavy surface fuel concentrations and develop continuous fuel ladders. These conditions have elevated the risk of destructive, stand-replacing fires occurring in the watersheds.

Timber harvest that occurred during most of the 20th century was designed to remove larger trees and old forest stands and replace them with fast growing plantations of mostly seral tree species. This had the effect of further reducing the availability of large snag and down logs across the watersheds. The protection of dead wood habitat within timber harvest units did not become a consideration until the latter part of the 20th century.

The Sweet-Ione project would reduce the risk of stand-replacing fires and would move the watersheds closer to their historic fire regime. As a result, a more continuous, stable supply of snags and logs is likely to be provided over time, than had no forest management occurred. No other timber sales would be active on NFS lands in the watersheds concurrent with the project or are presently planned in the area. No other fuels reductions projects would be active or are planned on NFS lands in the watersheds.

Any future timber sales in the watersheds would reduce dead wood habitats to some extent. All timber sales on NFS lands would incorporate similar standard practices and design elements to the Sweet-Ione project to meet Forest Plan direction for the conservation of existing snags and logs. Large snags and logs would continue to be available at levels below historic conditions for the foreseeable future, in most locations across the watersheds. Because of this, these structures would be retained in all timber harvest units on NFS lands to the extent feasible. Small snags and down logs would continue to be available at levels which generally meet or exceed the historic range of variability for these structures. Dead wood habitats would be conserved on state and private lands according to WA State Forest Practices regulations. Generally, where forest management occurs on those ownerships, dead wood habitat would be retained to a much lesser degree than on NFS lands.

Any future prescribed fires initiated in the watersheds would be intended to reduce logging slash, remove undesirable regeneration, promote the growth of fire-adapted tree species, and rejuvenate grasses and desirable browse for wildlife. There should be small, net gains in standing dead trees (and over time, down logs) in burned areas, based on our monitoring (pers. comm. with E. Trimble 2009).

Personal use wood cutting would continue to reduce standing snag populations within 200 feet of open roads in the watersheds. These effects would be cumulative to those resulting from the Sweet-Ione project. However, the project would locally reduce open road densities, consistent with desired conditions for specific Forest Plan Management Areas. This would have the effect of incrementally reducing dead tree habitat loss to wood cutting.

2.6.3.4 Effects Determination

If forest management were not initiated in the project area, there would be no immediate effect on dead wood habitats. Large diameter snags and down logs would continue to be below historic levels over the mid to long term, until additional late structural stage stands can develop. There would be an increasing risk of high intensity fires resulting from the build-up of forest fuels and fuel connectivity. High severity fire regimes are typified by “boom and bust” cycles of snag and down log recruitment (Spies et al. 1988, in Agee 2002).

The Proposed Action would move the landscape closer to its historic fire regime by thinning out dense stands and reducing fuel loads and connectivity. This could set the stage for a more continuous recruitment and stable population of snags in the area over time.

The Proposed Action would be consistent with all Forest Plan guidance related to the conservation of existing dead wood habitats. The project would be designed to move the watersheds towards their historic range of variability for stand structural stages. Scientists with the Interior Columbia Basin Ecosystem

Management Project (ICBEMP) assumed that by managing forests to restore HRV conditions in each watershed, adequate habitat for native wildlife species would be provided in the basin because species survived within that range of habitat levels in the past (Wisdom et al. 2000).

The Proposed Action would include the creation of snags from green reserve trees in harvest units where necessary to meet desired levels in the Forest Plan. The project would promote the long-term expansion of hardwood stands through timber harvest and prescribed burning. Access to standing snags for firewood cutting would be reduced through the closure of almost 15 miles of open roads. Proposed under-burning should result in small net gains in snags numbers within treated areas.

Based on this discussion, the project as proposed may impact cavity excavators and secondary cavity users but should not contribute to a negative trend in viability for these species across the forest.

2.7 Deer and Elk (species of management interest)

2.7.1 Management Framework

On the Colville National Forest, deer and elk are species of management interest due to their high importance for hunting, viewing, and photographing. Special monitoring and management are required to maintain habitat to support stable populations (Gaines et al. 2017).

2.7.1.1 Forest Plan Desired Conditions and Guidelines

FW-DC-WL-13. Deer and Elk Habitat - Summer and Winter Range Cover and Forage (page 60)

Cover and forage levels for deer and elk summer and winter ranges are within the historical range of variability (HRV) for vegetation.

FW-DC-WL-14. Deer and Elk Habitat - Human Activities (page 60)

Winter ranges for deer and elk provide a high level of habitat effectiveness by having less than 30 percent of the winter range within the zone of influence (0.25 mile) of an open road or motorized travel route. Summer ranges provide a moderate level of habitat effectiveness by having less than 50 percent of the summer range within the zone of influence of an open road or motorized trail.

FW-GDL-WL-01. Hiding Cover for Wildlife (page 64)

Where the opportunity exists, retain clumps or patches of shrubs and trees to provide hiding cover (minimum sight distance) along open roads adjacent to created openings. To the extent feasible, maintain the hiding cover value of these vegetative clumps and patches during post-harvest site preparation and fuels treatments.

FW-GDL-WL-13. Mule Deer, White-tailed Deer and Elk Habitat - Human Activities (page 66)

Human activities should be restricted to designated routes during the wintering period of December 1 to March 31 in winter range. When human activities must occur (i.e., winter logging), adequate displacement areas should be provided to maintain the effectiveness of the wintering area.

FW-GDL-WL-14. Mule Deer, White-tailed Deer, and Elk Forage (page 66)

Production of browse and other forage should be stimulated on winter ranges.

2.7.2 Existing Conditions

White-tailed deer are well-distributed across the forest. Mule deer tend to be more common in open habitats in the western third of the forest (Ferry County), and more localized elsewhere. Rocky Mountain elk occur more commonly in the eastern and central portions of the forest (Pend Oreille and Stevens Counties). Deer and elk use most habitat families / groups including those that provide concealing forest

cover and abundant forage in the form of green plants (grasses, sedges, forbs), and woody browse (riparian and upland shrubs, hardwood trees).

Big game animals typically winter in low elevation valley bottoms and the adjacent, lower portions of slopes, particularly on more exposed aspects. Approximately 4,767 acres (23 percent) of the Sweet-Ione Project is providing winter range for big game animals. Animals effectively utilize the entire project area during the warm months.

2.7.2.1 Summer and Winter Range Cover and Forage

As shown in Tables 4 and 5 of this report, there are large surpluses of stands in mid-closed structural stages on NFS lands in the Sweet and Big Muddy Creek Watersheds, relative to historic conditions. These stands are providing forested cover for big game animals. They typically do not have high forage values since their dense overhead canopies suppress the growth of sun-loving forage plants on the forest floor. Early, and late-open structural stage stands are mostly well below the historic range of variability for these stand types. These open canopy stands typically provide the best growing conditions for green forage and woody browse plants utilized by big game. Thus, the watersheds tend to be “cover-rich” and lacking in open, productive foraging sites, relative to historic conditions. Only about 10 percent (486 acres) of the big game winter range in the watersheds appears to be providing productive foraging sites.

2.7.2.2 Motorized Route Influence Zones

Much research has underscored the importance of the effects of roads and other linear recreation features on the effectiveness of habitat for deer and elk (Thomas et al. 1979, Rowland et al. 2005, Wisdom et al. 2005). Big game animals tend to under-utilize areas within 0.25 mile of open roads and motorized trails, compared to areas further removed from these features. Within road corridors animals are prone to disturbance from vehicle traffic, and mortality from vehicle collisions, legal harvest, and poaching. Table 35 displays the existing levels of open road influence zones on big game winter and summer ranges in the project area, relative to Forest Plan desired conditions.

Table 35. Existing acres influenced by open motorized routes on deer and elk ranges

Big game range	Approximate acres within 0.25 mile of open roads	Percent of Range	Forest Plan Desired Condition	Current level of human influence
winter range	3,379	71%	<30% of the winter range	High
summer range ¹	15,934	78%	<50% of the summer range	High

¹ Summer range is the entire project area, since deer and elk are dispersed across the project area during the summer months.

As displayed in the preceding table, the current potential for big game to be disturbed and displaced by vehicle traffic in the Sweet-Ione Project Area is high. An important caveat to this finding is that while most of the roads on big game winter ranges are not physically closed, motorized travel on Forest Service roads is prohibited from December 1 to March 31 as shown on the CNF Motor Vehicle Use Maps. We have not documented un-authorized snowmobile use of these roads, likely because snowmobilers normally travel the designated snowmobile routes up into the higher elevations. We have occasionally documented unauthorized wheeled vehicle use of roads on the winter range when the snow depth is shallow.

2.7.3 Environmental Consequences

2.7.3.1 Direct and Indirect Effects of No Action

If forest management were not initiated in the project area, there would likely be no immediate effect on deer and elk populations. Over time, areas of recent regeneration harvest and other open canopy stands would slowly become less open as conifers continue to grow. Forage plants in these areas would decline

in productivity as they become increasingly shaded out. In the absence of a disturbance that could set back forest succession, forage values across the project area could decline over time, potentially impacting the condition and productivity of big game animals. Animals could become more prone to moving off the forest during the winter months and utilizing private feed stocks intended for livestock.

Surface and ladder fuels would continue to accumulate incrementally in forest stands across the project area. The potential for a large, intense wildfire to remove entire stands of conifers would increase over the long run. In such an event, upland shrubs, grasses, and forbs could be killed outright in the hottest portions of the fire. Where the root systems of these plants remain intact, they would quickly re-sprout and take full advantage of the increase in sunlight striking the forest floor, post-burn. There would be a marked increase in productivity and palatability of these plants until regenerating conifers begin to re-capture the growing space. High intensity fires have the potential to burn large expanses of forest and result in very large openings. Big game animals would likely under-utilize forage resources in the interiors of large openings, owing to their distance from concealing cover.

Stand replacement wildfires are the most likely to provide good growing conditions for noxious weeds. With high intensity fires there would be more overhead canopy removed (higher light levels), more duff consumed (exposing soils), and less living vegetation for newly established weeds to compete with for sunlight, water, and soil nutrients. In areas of heavy weed infestation, existing native plants could be replaced, including those palatable to big game animals. Large infestations could change the way the animals use the landscape by effectively reducing the extent of available forage.

Open motorized route densities in the project area would remain unchanged.

2.7.3.2 *Direct and Indirect Effects – Proposed Action*

Summer and Winter Range Cover and Forage - Timber harvest and fuels treatments would reduce surface fuels and continuous fuel ladders. Post-project, any wildfires that occur in the area would be more likely to burn cooler and would have fewer pathways to ascend into the overstory tree crowns. The risk of a hot crown fire removing forest cover over large areas would be reduced over the mid-term.

Timber stands in the early (young), and open canopy structural stages are presently well below historic levels in the watersheds. These stands typically provide the best growing conditions for the sun-loving forage plants utilized by big game. Timber harvest would create additional acres of these stands and move the watersheds closer to HRV for stand structural stages. Thus, the Proposed Action would be consistent with Forest Plan Guideline: *FW-DC-WL-13. Deer and Elk Habitat - Summer and Winter Range Cover and Forage* (page 60).

Table 36 displays the proposed vegetation treatments that could improve forage production and quality on big game ranges.

Table 36. Proposed treatments that have the potential to improve forage for deer and elk

Big game range	Acres of created openings (shelterwood + 60% of mixed harvest)	Acres of partial harvest (commercial thin + 40% of mixed harvest)	Acres under-burn within harvest units	Acres under-burn outside units
winter range (4,767 acres)	86 + 123 = 209	1,866 + 82 = 1,948	1,205	77
summer range ¹ (20,434 acres)	3,121	4,759	2,505	865

¹ Summer range is the entire project area, since deer and elk are dispersed across the project area during the summer months.

Within openings created by timber harvest, existing browse and green forage plants could become markedly more palatable and productive, particularly where post-harvest burning occurs. In areas of partial harvest, existing forage plants should experience improved growth in direct relation to the amount of overhead tree canopy reduced.

The Forest Service would employ low-intensity, prescribed fires to reduce forest fuels both within and outside of harvest units. Within the treated areas, the above-ground portions of upland shrubs and grasses would be burned back. A “pulse” of nutrients would be released into the soil from the consumed vegetation, leaf litter, and dead wood. Existing forage plants on these sites should respond with profuse basal sprouting and regain most of their above-ground biomass in 1-2 growing seasons. The new growth on these plants should provide palatable and nutritious forage for some years following treatment. Thus, the Proposed Action would be consistent with Forest Plan Guideline *FW-GDL-WL-14. Mule Deer, White-tailed Deer, and Elk Forage* (page 66).

Noxious weeds could potentially colonize any soils exposed by logging equipment and prescribed fire. These plants may outcompete native forage plants for site resources. However, several factors would work to minimize the potential for noxious weed spread in the project area. Prescribed fires would be completed during optimum weather and fuel moisture conditions to ensure low-intensity fire behavior. Thus, most of the forest duff should be maintained in burned areas and very little soil should be exposed. New roads constructed with the project and selected open roads would be closed to the public. This would reduce the potential for noxious weeds to spread along road corridors. The project would incorporate routine mitigation to check the spread of noxious weeds such as seeding exposed soils at landings, skid trails and burn piles. Prior to the project, the Forest Service or a private contractor would use herbicides to treat weed infestations on roadsides and disturbed sites in the area.

Open Motorized Route Influence Zones - While the project is active, unauthorized motorized travel would be prohibited on all new roads, un-drivable roads opened for the project, and existing restricted (gated) roads. Following their use for the project, new roads and brushed-out roads would be effectively closed with native materials (ex., earthen berms). Certain roads that are presently open would be closed to public use to increase seclusion for wildlife. Thus, the Proposed Action would move the project area towards the Forest Plan Desired Condition *FW-DC-WL-14. Deer and Elk Habitat - Human Activities* (page 60). The table below displays the existing and post-project acres within 0.25 mile of open motorized routes.

Table 37. Post-project acres influenced by open motorized routes on deer and elk ranges

Big game range	Current acres within open road influence zone	Proposed Action acres within open road influence zone	Forest Plan Desired Condition
winter range	3,379 (71%)	3,371 (71%)	<30% of the winter range
summer range ¹	15,934 (78%)	14,454 (71%)	<50% of the summer range

¹ Summer range is the entire project area, since deer and elk are dispersed across the project area during the warm months.

Although the Proposed Action would increase seclusion habitat for wildlife from the current condition, the percentage of big game ranges within the influence zone of open motorized routes would remain high. For this project, we are not proposing further reductions in drivable route miles for the following reasons:

- The Forest Service has no jurisdiction over state, county, or privately owned roads in the area.
- We must provide reasonable (i.e., road) access to private in-holdings on the forest per the Alaskan National Interest Lands Conservation Act.

- The Bonneville Power Administration and Pend Oreille County Public Utility District #1 require road access to service their power transmission line infrastructure and maintain powerline corridors in an open condition.
- The U.S Air Force desires continued access on specific roads for their survival training exercises.
- Continued access on arterial and collector roads is needed / desired for forest management, recreation, special forest products collection (ex., firewood), and range allotment operations.

Roadside Hiding Cover – Where feasible, patches or strips of vegetation that can provide concealing cover for elk would be retained within forest openings created along open roads, consistent with Forest Plan Guideline *FW-GDL-WL-01. Hiding Cover for Wildlife* (page 64).

Disturbance to Wintering Big Game - We have sometimes observed deer foraging on lichens and conifer needles in harvest units while winter logging is ongoing. Elk appear to be more prone to being disturbed and displaced by winter harvest activities. To reduce the potential for disturbance to big game, project activities would occur outside the wintering period over most of the mapped winter range area, consistent with Forest Plan Guideline *FW-GDL-WL-13. Mule Deer, White-tailed Deer and Elk Habitat - Human Activities* (page 66). Wintering animals should be able to displace to these secluded areas, if necessary.

2.7.3.3 Cumulative Effects – Proposed Action

The cumulative effects analysis area for big game habitat is the Big Muddy and Sweet Creek Watersheds. No other vegetation management projects on NFS lands would be active concurrent with the Sweet-Ione project, and none are presently planned. Future projects would incorporate similar standard practices and design elements related to big game, as the Sweet-Ione project.

Timber harvest and prescribed burning proposed with the Sweet-Ione project would reduce conifer coverage and potentially increase the production and palatability of existing forage plants. These effects would complement the big game habitat improvements we have completed in the watersheds in recent decades such as: burning upland shrub fields to rejuvenate browse, removing encroaching conifers from meadows, and eradicating noxious weeds from roadsides, fields, and meadows.

Equipment operation required to complete the Sweet-Ione project could contribute to the spread of noxious weeds in the watersheds. These effects would be cumulative to those resulting from livestock grazing and forest recreation. To minimize this potential, the Forest Service would spray herbicides on roadside weeds prior to the project, seed soils exposed by equipment, close temporary roads, improve the effectiveness of existing road closures, etc. These actions are standard procedure for vegetation management projects on the forest. Active weed spraying programs will be necessary so long as forest management, grazing, and forest recreation continues.

State and private lands within the watersheds are unlikely to be managed with the needs of big game in mind. Managing to meet the HRV for vegetation is unlikely to be a consideration. Noxious weeds could increase on state and private timber lands over time, due to varying levels of commitment and resources available for prevention, treatment, and monitoring.

2.7.3.4 Effects Determination

If forest management was not initiated in the project area, existing habitats for deer and elk would be maintained over at least the short-term. Foraging opportunities would continue to decline as young trees grow within existing plantations. The risk of high intensity fires occurring in the area would increase incrementally over time. Such fires could remove forest cover over large areas and dramatically increase browse and green forage production for big game. Animals may under-utilize the interiors of large burn scars, however.

Timber harvest and fuels treatments proposed with the Proposed Action would move the watersheds closer to their HRV for vegetation. The forage component of big game ranges should be improved for 15+ years, particularly where timber harvest creates openings that are subsequently under-burned. The Proposed Action would move the project area towards a more historic fire regime, where big game cover and forage habitats are more likely to be sustained at stable levels over time. The project would reduce open road densities. All Forest Plan Guidelines for big game would be incorporated into the project design, as described earlier.

Based on this discussion, the Proposed Action may impact big game habitats and individual animals but should not contribute to a negative trend in viability of big game populations on the forest.

3.0 Degree to Which the Proposed Action Addresses the Wildlife Issues & Topics

Table 38. Comparison of current conditions and the Proposed Action in relation to the wildlife issues.

All values are approximate.

Resource Indicator	Measure (Quantify if possible)	Current Condition	Proposed Action
suitable late closed focal species habitat	acres of habitat relative to historic levels by 6 th field watershed	692 ac. below historic (Sweet) 536 ac. above minimum historic levels (Big Muddy)	692 ac. below historic (Sweet) 410 ac. above minimum historic levels (Big Muddy)
suitable late open focal species habitat	acres of habitat promoted through thinning Douglas fir -dry stands in the late closed structural stage	0	886 acres
deer and elk winter range forage	acres of open foraging sites,	486 acres existing openings (10 percent of winter range)	695 acres openings (15 percent of winter range)
	acres enhanced by under-burning	0	Up to 1,282 acres under-burned (27 percent of winter range)
seclusion for deer and elk	Percent of winter and summer ranges within a zone of influence of an open road (0.25 mile).	71 percent winter range, 78 percent summer range	71 percent winter range, 71 percent summer range (post-project)

4.0 Compliance with the Forest Plan and Other Relevant Laws, Regulations, Policies and Plans

The project as proposed would be consistent with Forest Plan desired conditions, objectives, standards and guidelines for sensitive species, surrogate species, and species of management interest. The project would be consistent with habitat strategies intended to conserve landbird focal species in the Northern Rocky Mountains of Oregon and Washington (Altman and Bresson 2017), as well as existing executive orders and memoranda of understanding related to landbirds.

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Appendix A: Other recent, (within 10 years) ongoing, or potential future projects / activities within the Big Muddy and Sweet Creek Watersheds

	Specific project / activity	Approx. years active	Normal season of activity	General effects to forest habitats and wildlife
Vegetation management				
timber harvest	sales on NFS lands	2010-2020	June 1 - October 31	<ul style="list-style-type: none"> • Approx. 27 acres of uneven aged harvest (reduced canopy) since 2010. • Approx. 9,023 total acres harvested since 1954. See the Current Vegetation section of this report.
timber harvest	sales on DNR, PVT	2010-2020	June 1 - October 31	<ul style="list-style-type: none"> • Approx. 298 acres of openings created on PVT, 15 acres on DNR since 2010. • Approx. 468 acres of uneven-aged harvest on PVT, 291 acres on DNR since 2010. • Known total harvest acres since 2002 = approx. 1,611 acres PVT, 450 acres DNR.
timber harvest	active / planned harvest on all ownerships	2021 -	June 1 - October 31	<ul style="list-style-type: none"> • Besides Sweet-Ione, no timber sales are active or planned on NFS lands. • Approx. 181 acres of uneven-aged harvest ongoing on private land. • Future harvest plans on PVT and DNR lands are unknown.
timber stand improvement	pre-commercial thin (FS)	2010-2020	summer - fall	<ul style="list-style-type: none"> • Approx. 526 acres of young trees thinned in plantations on NFS land since 2010. • Approx. 1,000 acres of young trees thinned since 1971.
reforestation	tree planting (FS)	2010-2020	spring or fall	<ul style="list-style-type: none"> • No acres planted on NFS land since 2010. • Approx. 600 acres of created openings on NFS land planted since 1980.
noxious weed control	spray herbicides to eradicate weeds on roadsides, landings, meadows (FS)	ongoing, as needed	spring - early summer	<ul style="list-style-type: none"> • Potential for non-target, native plants to be killed or injured. This could lead to local reductions in cover and forage plants for sensitive invertebrates and bees. • Should lead to local, long-term improvements in the coverage of existing native forbs, grasses, and non-native green forage plants. • Only herbicides formulated for use near surface waters applied around riparian areas.
Road management				
new road construction	construct roads for forest management	2010-	summer - fall	<ul style="list-style-type: none"> • Essentially all new roads built on NFS lands are closed post-sale. • New roads on private timber lands are typically closed to public use. • Approximately 3 miles of new road access on state timber lands since 2010.

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	Specific project / activity	Approx. years active	Normal season of activity	General effects to forest habitats and wildlife
road maintenance	maintain signs, drainage & bridges / repair failures / grade, lay rock in road prisms / brush roadsides	ongoing, as needed	summer - fall	<ul style="list-style-type: none"> Disturbance from equipment operation and impacts to soils confined to road corridors, rock pits, and borrow areas. Minor, local impacts to vegetation.
road easements	FS easements granted to BPA (4 roads), PVT (1 rd.)	permanent	year-round	Possible connected actions (timber sales) on private ownerships.
closure mtce. & monitoring	maintain / monitor gates and native material closures (FS)	ongoing, as needed	summer - fall	Potential improvements in closure effectiveness, enhancement of seclusion habitat.
Fire and fuels management				
fuels reduction	recent fuels treatments within harvest units (FS)	2010-2020	summer, fall	<ul style="list-style-type: none"> Approx. 50 acres machine work (masticate, grapple pile) on NFS lands. Unknown acreage of fuels reduction on private or state lands.
forest fire suppression & rehabilitation	initial attack, control, containment, mop-up, monitoring, BAER activities (all ownerships)	as needed	spring-fall	<ul style="list-style-type: none"> Varying levels of human disturbance. Impacts to vegetation and soils dependent on fire size and intensity. Mostly hand crews and fire vehicles used on small fires. On larger fires, heavy equipment and aircraft may also be used. Most fires confined to small acreages. Fire suppression could contribute to the incremental build-up of forest fuels, potentially leading to large-scale, stand-replacing fires over the long-term.
forest fire suppression & rehabilitation	Baldy Mountain Fire (NFS)	2015	summer	Approximately 75 acres burned within the Sweet-Ione Project Area. High severity (stand-replacing) effects in the highest elevations, mixed severity elsewhere. Pulse of snags created within the fire perimeter, most of which will fall to the ground in 1-3 decades, leading to a decades-long gap in snag availability. Rehab. activities included dozer trail rehabilitation, seeding, installing erosion control structures.
Habitat improvement				

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	Specific project / activity	Approx. years active	Normal season of activity	General effects to forest habitats and wildlife
wildlife habitat improvement	improve road closure effectiveness, create snags, rejuvenate woody browse with prescribed fire (FS)	2010-2020	spring-fall	<ul style="list-style-type: none"> Improved the effectiveness of 10 closed road entrances with piled slash & plantings, to increase seclusion for elk and other wildlife. Topped 22 green trees to supplement existing snags in timber sale units. Used hand crews to under-burn approximately 100 acres of shrubs / hardwoods in Jim Creek area to improve browse for elk.
Recreation				
recreation facility / site maintenance	maintain dispersed campsites & Hank's Butte snowmobile staging area (FS)	as needed	year-round	Maintain signs, remove trash / litter, pump one toilet. Insignificant or discountable effects.
OHV damage mitigation	Damage Response Team program (FS)	ongoing, as needed	spring - fall	Restore OHV hill climbs, pioneered trails, mud bogging areas, etc. by scarifying / leveling exposed soils, seeding, planting. Block user-created trails with fencing, piled slash, boulders. Install signage.
motorized recreation (summer)	full-sized vehicle, OHV operation	ongoing	spring - fall	Motorized disturbance mostly confined to open routes as shown on the CNF Motor Vehicle Use Maps. Occasional local impacts to soils and vegetation from illegal off-road travel.
motorized recreation (winter)	over-the-snow vehicle operation on designated trails, trail grooming	ongoing	winter	Insignificant or discountable impacts to vegetation. Motorized disturbance mostly confined to designated routes. Some snowmobile "play" in powerline corridors that are coincident with designated routes.
non-motorized recreation	dispersed camping, target shooting, geocaching, cross-country skiing, snowshoeing, sledding	ongoing	year-round	<ul style="list-style-type: none"> Activities tend to be intermittent in the watersheds. Potential disturbance mostly confined to campsites and road corridors. No hiking trails in the watersheds. Camping in these watersheds mostly confined to the hunting seasons. Potential impacts from camping include soil compaction, damage to trees and other vegetation, improper sanitation, littering, refuse dumping. Potential for wildlife to access human foods at campsites, possibly leading to human-wildlife conflicts.
harvest of game species	hunting, fishing, trapping, antler shed gathering, game camera operation	ongoing	per WDFW regulations	<ul style="list-style-type: none"> Game species managed by WDFW to maintain healthy, productive populations at sustainable harvest levels. Varying levels of disturbance / stress to wildlife. Potential for incidental take of TES species due to mistaken identification by hunters, fishers, & trappers, or through poaching.

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	Specific project / activity	Approx. years active	Normal season of activity	General effects to forest habitats and wildlife
Special use permits				
utility corridor operations & maintenance	FS special use permits for power transmission lines (BPA, PUD), and buried telephone line (POTC)	typically, every 3-5 years	spring - fall	Periodic maintenance of permanent, linear forest openings (power lines) via small tree removal, brush topping and spot herbicide application. Disturbance from chainsaw operation. Disturbance from aerial (helicopter) monitoring, twice annually (Oden 2021).
military training	FS special use permit for the US Air Force Survival School	episodic (not every year)	year-round	<ul style="list-style-type: none"> • Small scale impacts to vegetation from trampling / soil compaction, bough collection, berry collection, etc. Some harvest of fish and small mammals. • Motorized disturbance mostly limited to drivable road systems. • Occasional high-level disturbance from aircraft use.
mineral prospecting	using dredges and other power equipment in Big Muddy Creek	ongoing	Aug. 1 – March 15 (WDFW regulations)	<ul style="list-style-type: none"> • If dredging occurs in the watersheds, it is likely on an intermittent basis. • Disturbance from human presence, motorized equipment. • Equipment operation could impact fish spawning gravels, input sediment to the stream water column.
mineral prospecting	using gold pans and other hand-held, non-motorized equipment in all streams	ongoing	year-round	<ul style="list-style-type: none"> • If gold panning occurs in the watersheds, it is likely on an intermittent basis. • Low level disturbance from human presence.
forest products collection	FS, DNR special use permits for collection of firewood, berries, mushrooms, floral greens, Christmas trees, landscape rock, etc.	ongoing	spring - fall	<ul style="list-style-type: none"> • Local reductions in snags, down logs, berry crops, mushrooms, small conifers, etc., mainly within 200 feet of open roads. • Disturbance from chainsaw use / human activity.
Range management				

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	Specific project / activity	Approx. years active	Normal season of activity	General effects to forest habitats and wildlife
livestock allotment operation / administration	Tiger Hill Range Allotment (FS)	ongoing	June 1 – Sept. 30	<ul style="list-style-type: none"> • 129 cow / calf pairs grazed annually in the Big Muddy Creek Watershed. • Potential for local reduction of hardwood tree regeneration and riparian shrub density / diversity from livestock browsing. • Potential for local impacts to stream banks, water quality from livestock trailing & watering. • Potential for noxious weed spread on livestock fur and in feces. • Potential for livestock / predator conflicts. • Grazing reduces the rate of conifer encroachment into meadows. • Grazing removes rank grasses and maintains grass vigor and palatability.
Survey and monitoring	Specific project / activity	Approx. years active	Normal season of activity	General effects to forest habitats and wildlife
vegetation surveys and monitoring	<ul style="list-style-type: none"> • Forest Inventory & Assessment (FIA) plots, • other forest vegetation surveys and research (FS, PVT) 	episodic	spring -fall	Motorized disturbance limited to drivable roads.
fish and wildlife surveys and monitoring	<ul style="list-style-type: none"> • wolf trapping, • radio monitoring of wolves & grizzly bears, • surveys for goshawk nests, camera sets for rare forest carnivores, • fish shocking, etc. • FS, WDFW, USFWS, KTI 	episodic	year-round	<ul style="list-style-type: none"> • Motorized disturbance mostly limited to drivable roads. Occasional disturbance from aircraft use (WDFW). • Potential for stress or incidental mortality to wildlife captured for research purposes (FS, WDFW).

BAER – burned area emergency response

BPA – Bonneville Power Administration

DNR – Washington Department of Natural Resources

FS – USDA Forest Service

KTI – Kalispel Tribe of Indians

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NFS – National Forest System

OHVs – off-highway vehicles

POTC – Pend Oreille Telephone Company

PUD – Pend Oreille County Public Utility District #1

PVT – private land

TES – threatened, endangered, and sensitive species

USFWS – USDI Fish and Wildlife Service

WDFW – Washington Department of Fish and Wildlife

Appendix B: Viability Outcomes for Surrogate Species

The Forest Plan (Appendix C) selected a group of “surrogate” wildlife species to represent specific habitats and risk factors across the forest. The viability of surrogate species should be enhanced by providing the appropriate mix of stand structural stages by vegetation type and reducing risk factors. Descriptions of the potential “viability outcomes” for surrogate species on the forest are as follows (Gaines et al. 2017).

Viability Descriptions:

- A-** Suitable environments are broadly distributed across the historical range of the species. Habitat abundance is high relative to historical conditions. The combination of distribution and abundance of environmental conditions provides opportunity for continuous or nearly continuous intraspecific interactions for the species.
- B-** Suitable environments are broadly distributed across the historical range of the species. Suitable environments are of moderate to high abundance relative to historical conditions, but there may be gaps where suitable environments are absent or present in low abundance. However, any disjunct areas of suitable environments are typically large enough and close enough to permit dispersal among subpopulations and to allow the species to potentially interact as a meta-population. Species with this outcome are likely well distributed throughout most of the assessment area.
- C-** Suitable environments are moderately distributed across the historical range of the species. Suitable environments exist at moderate abundance relative to historical conditions. Gaps where suitable environments are either absent or present in low abundance are large enough that some subpopulations may be isolated, limiting opportunity for intraspecific interactions especially for species with limited dispersal ability. For species for which this is not the historical condition, reduction in the species’ range in the assessment area may have resulted. Species with this outcome are likely well distributed in only a portion of the assessment area.
- D-** Suitable environments have a low to moderate distribution across the historical range of the species. Suitable environments exist at low abundance relative to their historical conditions. While some of the subpopulations associated with these environments may be self-sustaining, there is limited opportunity for population interactions among many of the suitable environmental patches for species with limited dispersal ability. For species for which this is not the historical condition, reduction in the species’ range in the assessment area may have resulted. These species may not be well distributed in the assessment area.
- E-** Suitable environments are highly isolated and exist at very low abundance relative to their historical conditions. Suitable environments are not well distributed across the historical range of the species. For species with limited dispersal ability there may be little or no possibility of population interactions among suitable environment patches, resulting in potential for extirpations within many of the patches, and little likelihood of recolonization of such patches. There has likely been a reduction in the species’ range from historical conditions, except for some rare, local endemics that may have persisted in this condition since the historical period. Species with this outcome are not well distributed in the assessment area.

Appendix C: Wildlife Resource Survey Log

Target species	Survey type	Results of survey	Approximate survey dates
elk, forest carnivores	Road status review	All roads classified as: open, restricted, or un-drivable	coincident with 2018-2019 field surveys
lynx	Lynx range stand review	Stands typed to lynx habitat components	2018: 7/5, 7/11, 7/16, 7/17, 7/25, 8/27 2019: 8/15, 8/27, 8/28, 9/10
lynx	Snowmobile track surveys (WDFW)	No lynx detected.	winter of 2008
lynx	Remote camera traps with volunteers (2 sites)	No lynx detected	winter of 2013
forest carnivores	Remote camera traps (8 total sites)	Species detected: moose, elk, white-tailed deer, coyote, bobcat, cougar, black bear, snowshoe hare, striped skunk, raven, songbirds	2018: 8/9 through 10/24 2019: 6/19 through 10/15
northern goshawk	Broadcast taped calls, specific searches for active nests, return visits to known nests	Two new active goshawk nest stands detected Two sharp-shinned hawk nest stands incidentally detected.	2018: 7/2, 7/5, 7/9, 7/11, 7/12, 7/18 2019: 6/9, 6/12, 6/18, 6/20, 6/24, 6/25, 6/26, 7/10, 7/15, 7/16, 7/29 2020: 6/17, 7/15, 7/21
all	General stand exams for wildlife habitats	Data collected on stand structural stage, vegetation type, tree species, understory plant species, canopy closure, dead wood habitats, wildlife sign, etc.	2018: 7/12, 7/17, 7/25, 7/26, 8/7, 8/9, 8/15 2019: 6/12, 6/18, 6/24, 6/26, 7/16, 7/19, 8/5